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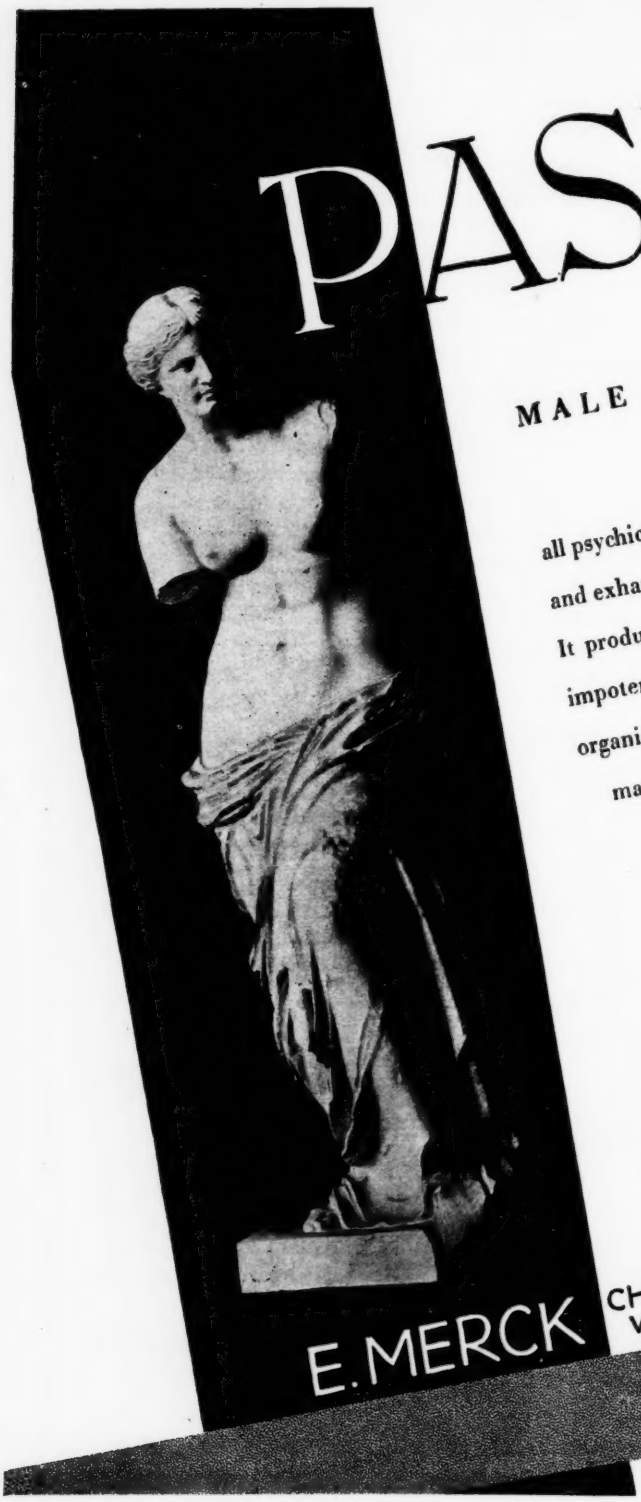

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Further Investigations on Gastro-duodenal Ulcers

B. V. MULAY, M. S., (Bombay),
Sholapur.

Introduction

I read a small paper on gastro-duodenal ulcers before the All India Medical Conference during its Sessions in Poona in the year 1931. The paper was practically an account of the operative work I did for gastric and duodenal ulcers since 1917 and I dealt in the paper with the bare facts, I came across, and had made no pretentions to doing any research work on gastro-duodenal ulcers. I must admit without reserve that owing to the up-hill and strenuous work I had been doing from 1917 to 1930, in building up surgical work in Sholapur under the most adverse and despairing conditions and owing to the rapidly growing work of the new Dhanarajgirji Hospital, which came to my help as a windfall, in 1931, through the charity of Raja Dhanrajgiri I have not been able to spare sufficient time for doing work on the lines real of research. However I have made a small attempt since 1931 to tackle with this question with the help of the X-ray on the lines of the discussions and controversy that arose in Poona. It was surprising to me that my paper gave rise to very interesting and instructive discussion in which Drs. Dudha Khanolkar, Suryawanshi, Kaikini, Gokhale Bharucha and Erulker took prominent part. Two important points amongst others that were hotly discussed and attacked were, whether the usual diet of the class of people from which most of these ulcers came for treatment viz., *Jawari bread* and *chillie paste*, was the chief cause of these ulcers, and whether these were cases of gastric carcinoma or duodenal ulcer. Drs. Dudha and Erulkar thought that a special diathesis was responsible for such ulcers but until this view is proved by investigations I am not prepared to accept it. I have made an attempt in this paper to support by argument and statistical proofs the theory that the diet is the chief cause of these ulcers. The second point that the so-called gastric ulcers were either duodenal ulcers or cases of gastric carcinoma, was sponsored by Dr. Khanolker and supported by Dr. Tirumurti both of whom are eminent pathologists of Bombay and Madras on their findings from the autopsies done in the medical college hospitals. I have tried to deal with this point with the help of the X-ray.

Aetiology

Coming to the question of ætiology first, the records of the London Hospital show that the age incidence in acute ulcers is 20.45. We have no statistics on this point in the periods of Dhanarajgirji Hospital, Age incidence in chronic ulcers :—

London hospital—

Male	.. 35 to 45	
Female	.. 25 to 35	

Dhanarajgiriji Hospital—

Female	.. 20 to 30	25 cases
,,	.. 31 to 40	12 ,,
,,	.. 41 to 50	9 ,,
,,	.. 51 to 70	2 ,,

Age was not recorded—2 cases

Sex incidence :—

London Hospital			
	chronic ulcers.	Males ..	100
	,, ,,	Females ..	107
Choyce's cases	,, ,,	Females ..	37
,, ,,	,, ,,	Males ..	60
Dhanarajgirji Hospital			
	chronic ulcers.	Males ..	42
	,, ,,	Females ..	7
	,, ,,	Hindus ..	43
	,, ,,	Mahomedans	6

Hindu population around Sholapur 88¼ p.c.
Mahomedan population around Sholapur 12¼ p.c.

It will be evident from the statistics given that gastric ulcer is found to be almost equally prevalent amongst both sexes in English hospitals, that age incidence for—chronic ulcer in the case of males and females combined, is the same in both the countries, that in statistics of the Dhanarajgirji hospital, the ulcer is much more common in the males than in the females, and that the acute ulcer practically does not exist, in the sense it is met with in England. A study of my cases of which about 250 were actually operated upon during the last 15 years, clearly points to one particular cause, the peculiar diet. These ulcers are mainly found amongst the labouring class of the villages and are comparatively rare in the urban labour, incidence being 44 rural and 5 urban.

The diet of the villager is *Jawari bread* and a paste of pungent articles and *chillies* with a smattering of *dal* and vegetable which are often absent. This diet is their mainstay from childhood often as early as 3rd or 4th year. Milk, ghee, rice and sugar are looked upon as dainties, to be indulged in meagrely on rare occasions in the year. This state of diet is entirely due to rank poverty and I leave it to the readers to imagine the effects that will be produced on the gastric mucous membrane by the constant action of the gastric contents and rendered more harmful by the excessive secretion of hydrochloric acid and pepsin resulting from the stimulation of the pyloric glands by the *chillies*. The urban labour is a bit more liberal in dietary, owing to their better earnings. Dal, ghee, oil, green vegetables are more freely used and chillies are mixed in smaller quantities. It is definitely evident from our records that the incidence of gastro-duodenal ulcer is much less in this class of labour. Take again the case of another sect amongst the Hindus viz., the *Lingayat* who would easily beat other people in the use of *chillies*. But their diet is better supplied with oil, milk, ghee and vegetables, and gastro-duodenal ulcer is not so prevalent amongst them. The Mahomedan uses more meat in his diet and is expected to be more liable to gastro-duodenal ulcer. In actual practice meat is found to be a small part of his diet, which is mainly made up of *Jawari bread* and *chillies* like his Hindu brother. The Mahomedan in the city uses more meat but less *chillies* and is not susceptible to gastro-duodenal ulcer as his class-man in the village, where incidence amongst the Hindus and the Mahomedans is equal. Dr. Terumurti in giving his experience in the Madras Presidency stated that *chillies* form an important part of their dietary along with rice and yet gastro-duedenal ulcer was not so common in Madras. With due respect to him it is necessary to point out that the worthy Professor is not expected to come across such cases, which can be picked up in the out-patient department alone. However I can definitely say that with my small experience in dealing with a class of people, that originally belonged to the territories adjoining the Madras districts, and that temporarily settled down in Sholapur :—The *Telegu* weavers, *Padmsali*, whose diet is the same as that of Madras, I have found gastric ulcer not unusual and further I can say that the *Telegu* class provides to our hospital more cases than any other single class of people in the city of Sholapur.

The next controversial point in the ætiology is "how is this ulcer produced ?"

The one important finding on which I base my theory about the mode of production of the ulcer is "the site of election of the ulcer". In a series of 27 cases dealt with by the X-ray screen or skiagram, the findings being verified at the time of operation, the following facts were found.

Site of ulcer.	No. of cases.
Prepyloric	10
Pyloric	10
Duodenal 1st part ..	5
,, 2nd ,, ..	1
Lesser curvature ..	1
Total ..	27

Theory :—The stomach is constantly in a state of irritation due to the presence of *chillies*

and a condition of chronic gastritis slowly supervenes. The inflammatory process and the chillies produce more activity of the pyloric and other glands, which throw out excessive hydrochloric acid and pepsin into the stomach, in the early history of the ulcer. The pyloric and prepyloric portions of the stomach are most exposed to the chyme during the process of digestion and evacuation of the gastric contents into the duodenum. The coarser particles of chillies specially the seeds stick on to the mucous membrane and cause localised hyperaemia, denudation of the epithelium resulting in an ulcer. Slight damage of this nature heals up but the affected patch of mucous membrane becomes vulnerable and the ulcer recurs, until the whole thickness of the mucous membrane is destroyed exposing the sub-mucous tissue. Once this stratum is reached healing becomes difficult due to auto-digestion by the pepsin and hydrochloric acid. The process of further digestion is delayed by alkalies which the patient easily finds but to be useful in giving relief. Chronic gastritis which is in progress produces inflammatory infiltration around the gastric glands, which in time gives place to fibrous tissue, reducing glandular activity. The chyme under this condition becomes less auto-digestive and the activity of the ulcerative process is checked to a certain extent and at the same time nature tries to strengthen the base of the ulcer by an over-production of fibrous tissue. As the ulcer does not get a chance of complete healing, the fibrous tissue increases until its contraction results in stricture of the pyloric region or a condition of rapid pylorus due to infiltration of its wall, resulting in an inefficient valve-action (the infiltration involving the wall in a circular way). The condition of chronic gastritis can be demonstrated on the operation table by observing the smooth surface of the mucous membrane, the thickening of the submucous tissue, flattening of the rugae, dilatation and ptosis of the stomach.

It is quite probable that a small number of these ulcers started by necrosis of a patch of mucous membrane due to infection of the lymphoid tissue and lymph-glands in the mucous membrane by infarcts from septic foci, in the body such as periodontitis, which affection is not unusually found in cases of gastro-duodenal ulcers. Such infarcts are, however, expected to produce ulcers in different parts of the stomach but the statistics already given above show that the largest number of them are situated in the *pars pylorica* and this fact lends further colour to the suggestion that the ulcers are in most cases due to the direct action of the highly irritating chyme.

Nature of the ulcer and its situation on the pyloric wall deserve some attention. From the theory propounded above regarding the production and progress of the ulcer, it is evident that owing to the large formation of fibrous tissue which tends to involve the whole segment, in which the ulcer stated is essentially of the "indurating type" and the nearer it is placed to the pylorus the quicker is the formation of stricture in the area. As these ulcers come for treatment in the advanced stage, it is rather a hazard to state definitely on which wall of the pylorus it begins. Very often on the operation table the fibrous tissue is found to extend far and wide and a sort of a dense ring is felt. Some times the induartion is localised and can indicate the site of the ulcer. Further light on this point is thrown by the adhesions formed around the ulcer. The affected area is often found adherent to the meso-colon and in only a very small number of cases the posterior wall of the stomach is found adherent to the posteriror wall of the lesser sack and it becomes, under this condition, difficult or impossible to pull down the posterior gastric wall through the opening in the mesocolon for anastomosis for posterior gastro-jejunostomy. From these findings in the operation room, I have formed an opinion that a large number of these ulcers are originally placed on the anterior wall of the pylorus and rarely on the posterior wall or the lesser curvature.

The ulcer can never be called perforating in the real sense of the terms as perforation has not been found to occur by a process of penetration of the base of the ulcer by the digestive action of the gastric enzymes. I have met with so far 3 cases of perforation and in each case the perforation was due to the repture of the pylorus proximal to the stricture.

Adhesions :—The pylorus, which is more commonly involved is usually found to contract adhesions to the mesocolon and these adhesions are markedly demonstrated while pulling down the posterior gastric wall for anastomosis. It is only after the adhesions are cut through that the pylorus usually becomes more movable and the posterior

wall comes down easily. Adhesions are more marked if the ulcer be placed on the posterior surface and very often in such cases anteroir gastro-jejunostomy has to be done, instead of the posterior. Adhesions to the gall bladder, the liver and the hepatic flexure of colon are found but are not so common as the adhesions to the meso-colon and are more usually associated with duodenal ulcers.

The Vermiform Appendix :—In the whole of my series of operations on the stomach for gastro-duodenal ulcers, I have only rarely come across inflamed appendix. It was customary with me to remove the appendix in operation for gastro-deudenal ulcers, but more recently the appendix is removed only if it be found abnormal or chronically inflamed. It is probable this is due to the fact that appendicitis is a trouble not very common in and around Sholapur.

In the discussions during the Poona Sessions and important controversy arose when PROFESSOR KHANOLKER expressed an opinion that most of the cases in my series were either duodenal ulcers or carcinomata of the stomach, gastric ulcers in his opinion being rare. This view DR. KHANOLKER supported by his findings on the autopsy materials of the King Edward Memorial Hospital in Bombay and he was seconded by Prof : TIRUMURTI of the Madras Medical College. I was quite definite about the nature of the lesion being predominantly gastric in my series of about 200 cases, which I had done till the session of 1931 and the remarks of the two Professors set me seriously thinking as to how evidence should be procured about my assertion. When the X-ray plant was installed in our hospital, it gave me a means of carrying out investigations in the light of views expressed by the well known pathologists. I have operated upon 49 cases in 1931-32 and I have obtained skiagrams and screening reports in 27 cases before operations.

Before giving you the radiological findings in my series of cases, it would be worth while to say something for your information about the classical radiological signs of ulcer and carcinoma of the stomach and to give you an explanation how those signs are produced.

Classical radiological signs are :—

Carcinoma.—1. Out-line irregular over the seat of affection.
2. Persistalsis sluggish over the affected part and else-where.
3. Dilatation absent.
4. Stasis slight.
5. Emptying rapid.

Ulcer. —1. Out-line even with pointed *niche* or crater.
2. Persistalsis marked over the affected part.
3. Dilatation present.
4. Stasis more marked.
5. Emptying slow.

Outline :—Carcinoma is a growth, rapidly extending over a large surface and as the growth is uneven, its gastric surface is irregular. The sub-mucous and muscular coats over the growth become infiltrated causing stiffness in the wall. The barium shadow of a carcinomatous stomach, under the lesion, does not follow the natural contour of the viscus, owing to the stiffness caused by the infiltration, and it also shows irregularity in the outline corresponding to the irregularities on the gastric surface of the affected part.

Ulcer does not produce an over-growth but causes an excavation and the barium shadow shows the even contour of the stomach except at the site of the ulcer where owing to the penetrating process of ulceration a crater or niche is formed and this filled with barium throws a sharp conical shadow at the site of the ulcer, prominently above the shadow of the stomach opacity. Irritation of the ulcer causes a continuous muscular spasm around the ulcer and the muscle opposite the niche thrown into spasm forms the characteristic *incisura.*

Peristalsis :—In cancer the peristalsis over the lesion and around the affected part is sluggish and in ulcer it is strong at the lesion as well as in the other parts of the stomach.

Stasis :—In carcinoma, absence of spasm of pylorus due to lack of irritation and the rigidity of the wall caused by the infiltration of the gastric coat allow gastric contents to be easily emptied, while the strong spasm of the pylorus caused by the irritation of the ulcer delays the passage of the contents producing stasis.

Emptying :—The pathological factors described under stasis produce other phenomena viz., rapid emptying in carcinoma and slow emptying in ulcer.

Dilatation :—Lastly rapid emptying prevents dilatation in carcinoma while slow emptying results in a dilated stomach in the case of ulcer.

Having explained the classical radiological signs of carcinoma and ulcer, I propose to place before you the radiological characters in 19 cases of the series, and then discuss some of the important features, in comparison to and contrast with the classical signs mentioned above.

Character or sign.	Nos, present.	Nos. absent.	
Niche or crater	5	14	
Incisura	0	19	
Persistalsis	4	—	
Normal	13	2	
Dilatation	16	3	
Stasis	8	11	
Tone :	7	8(-)	4 normal pointing to formation of stricture.
Contour : even	12	abnormal 7	
Obstruction	10	9	
Gastritis	17	2	
Ptosis	15	4	

Operative findings confirmed radiological reports in 17 cases only.

Outline :—The absence of niche in the majority of cases and absence of incisura in all the 19 cases (niche and incisura, being the characteristic radiological signs of ulcer) can be sufficiently explained by the peculiar pathological findings of ulcers in my series. The ulcer is essentially of the indurating type and becomes shallow owing to the fibrosis as explained in the mode of formation of the ulcer. The fibrosis soon gives rise to induration and the muscle on the circumference of the pylorus at the site of lesion becomes involved in fibrosis. Spasm at this site cannot take place owing to destruction of the muscle and hence incisura is absent. It is expected that in an early stage both the niche and the incisura ought to be present and could be demonstrated.

The chronic condition of these ulcers will be evident from the data given below :—

Age of ulcer.	No. of cases.
2-6 months (unreliable)	4
6-12 ,,	1
1-2 years	13
2-5 ,,	11
5-10 years	10
10-20 ,,	2
20-30 ,,	1
Not noted	7
Total	49

Peristalsis.—Was increased in 13, reduced in 2 and normal in 4 cases and this is in keeping with the classical radiological sign.

Clinically perstalsis is evident in a large number of cases to the naked eye and in some it is so marked, 3-4 hours after food that the waves can be easily followed like the wrigglings of the earthworm from the left to the right in downward direction, sometimes ending at the pyloric spot in a loud rumbling.

Stasis and Emptying :—Stasis was present in 8, absent in 11, and emptying was slow in 8 but rapid in 11 of my series. In the early life of these ulcers, the wall of the pylorus being laden with fibrous tissue becomes rigid and hence less efficient as a sphincter. The tone of the gastric muscle hurries the contents through the pylorus the contracting power of which has already been damaged by fibrosis. It is exactly this feature which is confusing as it is pathognomonic of gastric cancer. It must however be noted that the rigidity of the pylorus is casued by fibrosis in ulcer and by infiltration of cancer cells in carcinoma. In the early stages of chronic ulcers emptying is rapid and there is no stasis, but in the later stages when stricture forms at the site of the lesion emptying becomes slow due to the obstruction and stasis is established.

Dilatation :—Depends on the amount of obstruction offered to the passage of food at the pyloric orifice either by spasm or by organic stricture. As gastro-duodenal ulcers do not come under observation very early it is not possible to say whether spasm of the pylorus ever causes any dilatation of the stomach. Most of the cases when first seen are fairly advanced and dilatation is only visible when fibrous stricture produces a permanent diminution in the size of the pyloric opening in later stages of these ulcers.

Other radiological signs observed were gastritis and ptosis. Gastritis comes into play from the earlier phases of such ulcers and is often due to the action of *chillie* and later on is aggravated by the

dilatation and stasis, causing mild putrefaction of the gastric contents.

Conclusion :—Looking at the subject through the radiological picture the most prominent feature appears to be fibrosis. Fibrosis can be caused by four pathological processes viz., (i) inflammation, (ii) syphilis, (iii) tubercle (iv) new growth.

Syphilis :—Taking syphilis first, its chronic manifestations are gumma and fibrosis. Gumma can form the starting point of an ulcer just as the necrosis caused by infarcts does. But such an ulcer would exhibit radiologically all the classical signs of the gastric carcinoma. Fibrosis of the pylorus will not cause the clinical signs and symptoms of the gastric ulcer, except those due to stricture producing obstruction to the passage of food. And then in how many cases of syphilis do we find the stomach involved ?

Tuberculosis :—Tuberculous affection of the stomach is very rare and was found 3 times in my series of 250 cases. It simulates gastric ulcer to a certain extent e.g. tenderness in the epigastric region and signs and symptoms of stricture. Diagnosis is made on the operation table unless there are many other manifestations of tuberculosis elsewhere in the abdomen and different parts of the body. In two of my cases the affection was in the form of a ring of tubercles encircling the pylorus like the tubercular ring on the small intestine, causing stenosis of the lumen. In the 3rd case the pylorus was studded with tubercles and with the enlarged glands around, had caused obstruction at the pylorus. Nature of this trouble was suggested before operation by a few outlying peritoneal lymph-glands and a low hectic temperature.

New Growth :—May be benign or malignant—

(1) In the case of benign growths signs and symptoms of gastric ulcer would be absent except those due to obstruction produced by the growth situated at the pylorus.

(2) Malignant growth—(*a*) Enceplaloid carcinoma becomes palpable very early and together with other signs cannot be mistaken for ulcer.

(*b*) Scirrhous carcinoma gives rise to some fibrosis and simulates gastric ulcer to certain extent. But the pain in this case is constant, eachexia is peculiar to it and can always be distinguished from the exhaustion caused by a long standing ulcer and its course is far too shorter. Radiological picture is also distinctive and age incidence is very rarely below 40 years.

Inflammation :—Chronic gastric ulcer is in my opinion the only pathological condition, producing fibrosis, which forms the peculiar radiological finding in my cases. Radiological picture is not similar to the classical picture of ulcers and the fallacy is sufficiently explained by the pathological process found to exist in the cases investigated, while the clinical picture is entirely different in carcinoma, including age-incidence.

Summary and conclusions.

(1) My investigations during 1931-32, with the help of the X-ray establish the fact that the cases of ulcers I have come across since 1917, of which about 250 were operated upon, were cases of gastric ulcer.

(2) The ulcer is of the indurating type.

(3) The food of the poor people in the rural areas is probably responsible for the ulcer.

(4) The ulcer does not show the classical radiological signs usually described in Western literature viz., niche, incisura, increased peristalsis, dilatation and slow evacuation.

(5) The apparent discrepancies of the radiological picture of my cases can be satisfactorily explained by the peculiar features observed viz., the favourite site of the ulcer being the *pars pylorica*, within 2" of the pylorus, the ulcerative process being more inclined to heal than penetrate, with a large production of fibrous tissue, and the adhesions of the pylorus to the meso-colon, and extending over 20 years.

It is my pleasant duty to acknowledge with gratitude the help and co-operation of my colleaque Dr. B. V. Joshi, the radiologist of the Dhanarajji hospital.

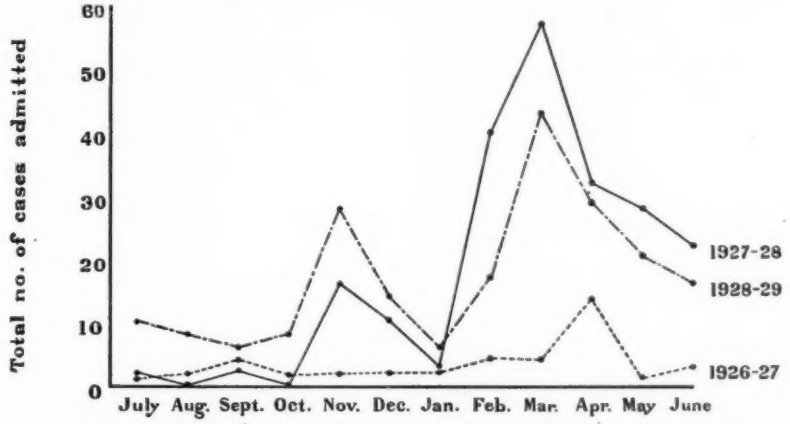
The place of Immunotherapy in the Treatment of Cholera*

A. C. UKIL,
Calcutta.

EPIDEMIOLOGY.

Our observations made in this paper are based on Cholera patients admitted into the Chittaranjan Hospital during the period July 1, 1926 to June 30, 1929. The curve of patients admitted into the Hospital corresponds to the presence or absence of epidemics raging in the city. It will be seen from the diagrams given below that there are two main curves of increase in a year, a smaller one in November-December and a higher one in March-April.

Monthly admission of Cholera cases in the Chittaranjan Hospital from July, 1926 to June 1929



N.B. The irregular curve in 1926-27 was due probably to irregular presence of cases, as the wards were then just opened for recieving Cholera cases

It will be further noticed that Cholera is never absent in Calcutta, which has got a filtered water supply, during any part of the year. The same relations hold good in the rest of Bengal, which has got hardly any filtered water supply.

Of the total admissions—493 in number during the period, 4% of the cases were proved to be of Bacillary dysentery, the majority being due to *B. Flexner*. Of the remaining clinically cholera cases, true Koch's vibrios (giving a positive sero-agglutination) were isolated in 81 % of cases, cholera-like vibrios (failing to give a positive sero-agglutination) were isolated in 7.2% of cases and no vibrios could be isolated in 7.8% of cases.

In a majority of cases (60.0%), the feces became vibrio-free within a week *after the stools became solid.* In 25.5% of cases it became vibrio-free within 2 weeks. 7.5% of cases showed vibrios up to 3 weeks and 1·5% up to 4 weeks. Only one case took 6 weeks to become vibrio-free. Isolation was always done by the 'Open Bowl' method of MAITRA and TOMB (1). No patient was discharged from the hospital unless and until two successive examinations showed the stools to be vibrio-free.

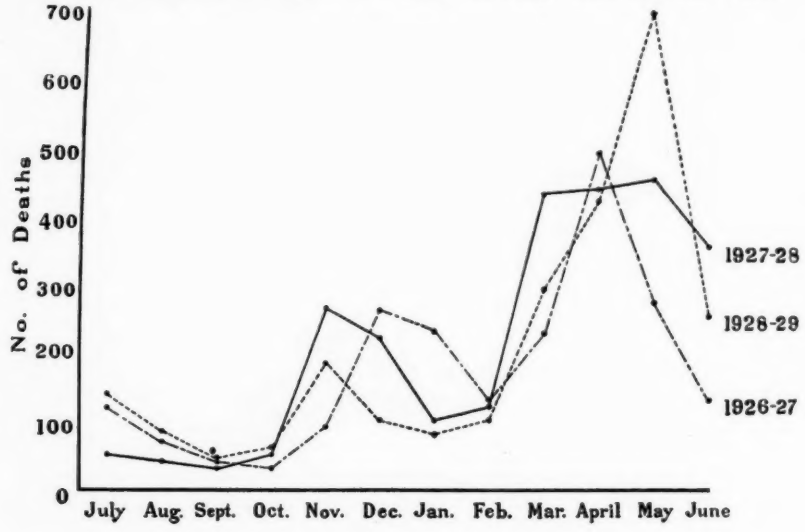
This control is not done in other hospitals in Calcutta. What ordinarily happens is that patients are discharged at a much earlier stage and so the number of carriers disseminated during an epidemic is always large. It may be pointed out that the outlying parts of the municipality of Calcutta

*Read at the first International Microbiological Congress at Paris, July, 1930, an abstract of which was published in the Proceedings, Vol. 1, pp 438-43, Masson and Co, Paris, 1931.

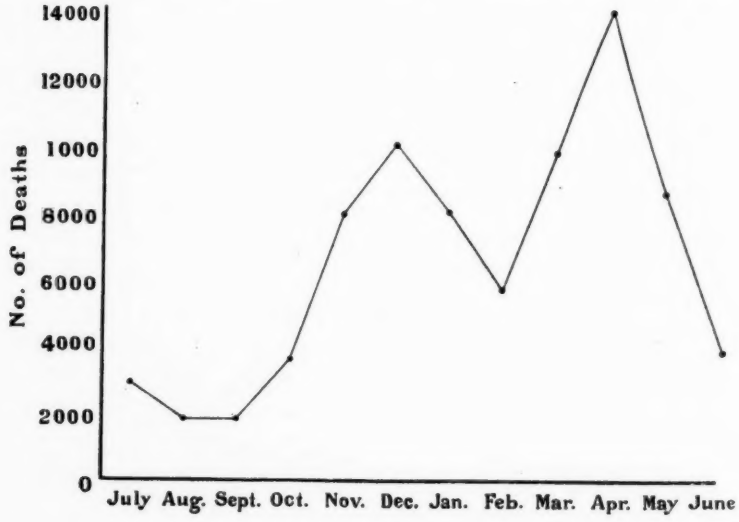
still contain many tanks, the water of which gets concentrated in summer before the rains and in winter after the rains. Owing to paucity of filtered water supply the people of these localities get into these shallow tanks to bathe and wash clothes. We have found that epidemic outbreaks are more frequent in these areas than in the centre of the City.

We are of opinion that epidemic outbreaks are a mere intensification of the endemic disease. The "carrier" plays a much more important role than it is ordinarily thought to be. It is difficult to say how far the association of relative humidity with high temperature or the concentration of organic matter in water-supplies favouring multiplication of vibrios is responsible for these in-

Monthly cholera mortality in Calcutta from July, 1936 to June, 1929.



Average monthly Cholera mortality in Bengal from 1918-1922



tensifications. Flies do not seem to be so important, because we have failed often to isolate true vibrios from the intestinal contents of flies captured during epidemics and because cases are much rarer and often absent in areas of Calcutta having a filtered water supply and having no tanks, though flies may be equally abundant in both the localities.

Another fact we want to note in this connection is that we get toxaemic cases, i.e. cases showing intestinal paralysis, hiccough, rapid suppression of urine and subsequent uraemia, more in the beginning of an epidemic than towards the end and that they are more frequent at the onset of the summer epidemic. It is also to be noted that individual epidemics differ both as regards the number and severity of the toxaemic cases. These variations in epidemics serve as good controls in considering the efficacy of a certain method of treatment.

Attempts were also made to see if there is any relation between the haemolytic power of the strains of vibrios isolated and the severity of the cases. The haemolytic power was not found related with agglutinability. The haemolytic power of some strains was lost later on (after some months). The results of haemolysis of the strains are given below :—

	Blood agar plates. (Sheep's blood)	Blood broth (Sheep's R.B.C. 5%)
No haemolysis ..	13·6%	26.6%
Strong ,, ..	46.5%	16.6%
Moderate ,, ..	33.3%	23.5%
Weak ,, ..	6.6%	33.3%
Total proportion giving haemolysis ..	86·4%	73.4%

It will thus be noticed that the "plate method" is more sensitive than the "liquid method" in testing for haemolysis.

The Present Position of the Treatment of Cholera.

The usual treatment employed in most hospitals in India is transfusion of saline and Sodii bicarb solution after Rogers. This is a method of symptomatic treatment to combat the loss of fluid and of certain salts from the body and the acidosis associated with it.

Though this treatment is very rational, we are of the opinion that sufficient attention has not yet been given to combat the toxaemia involved in the process. In our experiments with the serum of convalescent patients ([2]) and ([3]) and with the kidney condition of Cholera cases, we are of opinion that the toxaemia is specific from Cholera toxin absorbed from the intestines.

The damage to the kidneys is variable, depending on the toxaemia present, from cloudy swelling and degeneration of epithelium to fatty degeneration and shedding of epithelium. It seems that the toxins affect more the epithelium than the blood vessels. From an examination of the first two samples of urine passed by patients after treatment on admission—no albumen was found in 17 % of cases, a marked trace of albumen was found in 14% of cases and a faint or distinct trace in the remainder. In almost all cases showing albumen, casts (hyaline and granular) and R. B. C. were found. The percentage of urea varied from 0.7 to 1.5 in the first sample to 1.5 to 6.0% in the second sample. So when improvement takes place, the amount of urea excreted increases rapidly, the quantity of albumen diminishes and ultimately disappears, in most cases, in a few days.

That is to say, as soon as active immunity is established, the feces takes on the colour of bile, the serum of the patient shows a higher bacteriolytic power, the toxaemia disappears and the vibrios in feces rapidly diminish in number. The administration of the serum of recovering cases to other toxaemic patients has proved to be a powerful agent in neutralising the toxaemia and in saving such cases ([2]) and ([3]). According to D'HERELLE, the presence of the bacteriophage in the intestines is responsible for the improvement. We have not yet been able to observe whether the lytic substance in the feces of recovering patients appears at the same time and in the same cases as the increase of bacteriolytic power in the serum of these patients. We do not know also whether the lytic agent in the intestines and in the blood is of the same nature. The administration of Cholera bacteriophage to cholera patients in India ([4]) has, however, not been found to be as efficacious as convalescent serum and thus has not realised the claims made on its behalf. Experience shows that this active immunity in Cholera, as manifested by bacteriolysing does not last for a long time after recovery. Is it the same case with the

bacteriophage formed in a patient or does it resemble the serum in this regard ?

Another fact has been noticed by us which seems to be noteworthy. We have very often noticed a preponderating number of spirilles in the feces of Cholera cases in the reaction stage i.e. exactly at the period when potent bacteriophage is produced. Whether the presence of an excessive number of spirilles in the reaction stage has a bearing on the production of a lytic substance in the intestines we are not in a position to pronounce to-day.

RESULTS OF TREATMENT WITH SERA AND VACCINES.

Being emboldened by the results already obtained by the therapeutic use of convalescent serum ([2] and [3]) and being desirous of seeing whether the administration of commercial anti-cholera serum and sensitised vaccines influenced in any way the results of treatment, we employed the anti-cholera serum manufactured, according to HAHN'S method, by the Behring Werke of Marbourg and the sensitised vaccines prepared by PROF. BRUSCHETTINI of Italy and supplied by the Italo-Lusitanian Drug Co. of Calcutta. We are thankful to both the firms for supplying the necessary amount free to our hospital. The serum was tried through two mild and two severe epidemics and the vaccine through one severe and one mild epidemic. In either case, a control patient was always treated at the same time without serum or vaccine. The following tabulated data will illustrate the results obtained, by each method, at a glance.

Total number of cases admitted and cured.

	1926-27			1927-28			1928-29		
	Admitted	Cured.	Died.	Admitted.	Cured.	Died.	Admitted,	Cured	Died.
July	1	1	..	1	1	..	10	9	1
August	1	1	..	..	..	..	9	8	1
September	2	2	..	3	3	..	6	6	..
October	..	..	..	1	..	1	8	4	4
November	1	1	..	15	13	2	26	12	14
December	1	1	..	11	8	3	13	6	7
January	3	2	1	4	3	1	5	3	2
February	4	3	1	38	13	25	15	3	12
March	3	2	1	54	34	20	39	18	21
April	12	11	1	30	18	12	28	10	18
May	1	1	..	26	21	5	62	31	31
June	2	2	..	22	18	4	16	7	9
Total Cholera cases	31	27	4	205	132	73	237	117	120
Bacillary Dysentery	2	1	1	10	9	1	8	7	1

The following clinical data about the type and severity of the cases will be of help in judging about the efficacy of either serum or vaccine.

A. *Cases treated with Serum.* Total .. 137

I. *Specific gravity of blood on admission.*

1056	.. 2 cases	1064	.. 32 cases
1057	.. 4 ,,	1065	.. 9 ,,
1058	.. 7 ,,	1066	.. 15 ,,
1060	.. 19 ,,	1067	.. 1 ,,
1061	.. 2 ,,	1068	.. 2 ,,
1062	.. 26 ,,	1070	.. 1 ,,
1063	.. 17 ,,		

II. *Age incidence.*

1-5 years	1 case	26-30 years	25 cases
5-10 ,,	5 cases	31-35 ,,	26 ,,
11-15 ,,	3 ,,	36-40 ,,	11 ,,
16-20 ,,	13 ,,	41-50 ,,	24 ,,
21-25 ,,	20 ,,	51-60 ,,	7 ,,
		61-70 ,,	2 ,,

III. *According to religion and sex.*

Hindus	114	Males	109
Mahomedans	23	Females	28

IV. *Complications encountered.*

(1) Uraemia .. 10 curred, 22 died.

(2) Suppression of urine for
36 hours after admission 10 cases all cured
48 ,, ,, ,, 12 ,, ,,
72 ,, ,, ,, 12 ,, ,,
96 ,, ,, ,, 6 ,, ,,

(3) Tympanitis..10 cured, 20 died.

(4) Intractable hiccough..14 cases, all recovered.

(5) Persistent diarrhoea..17 cases, all recovered.

It will be seen from the above that tympanitis due to paralysis of the intestines is one of the most serious complications met with in Cholera.

This complication is mainly met with in the beginning of an epidemic and is due to severe toxaemia. In treating this complication we obtained better results with convalescent and concentrated than with unconcentrated serum, though in a large percentage of toxic cases no treatment was of any avail. In well-developed uraemia, the chances of success are undoubtedly much less. Complications like intractable hiccough and persistent diarrhoea are promptly relieved by serum.

Serum was administered both by intravenous and intramuscular routes. The relation between the quantity of serum used and the recovery rate is shown in the following table :—

Quantity of serum used.

	On admission.	Additional doses.	Recovery.	Death.
(1)	25 c. c. Intramuscularly	-	19	10
(2)	,, Intravenously	-	18	10
(3)	,, ,,	25 c. c. Intramuscularly	14	7
(4)	,, ,,	25 c. c. Intramuscularly	11	3
(5)	,, ,,	50 c. c. ,,	6	3
(6)	,, ,,	75 c. c. ,,	3	-
(8)	100c, c. Intravenously	-	3	2
(7)	50c. c. ,,	25c. c. ,,	-	2

Results of administration of concentrated serum.

(1)	25 c.c. intramuscular ..	1	1
(2)	30 c.c. ,, ..	1	1
(3)	50 c.c. ,, ..	1	..
(4)	20 c.c. intravenous 10 c.c. intramuscular	5	5
(5)	30 c.c. intravenous 10 c.c. intramuscular..	4	4
(6)	50 c.c. intravenous 10 c.c. intramuscular ..	2	2

B. *Cases treated with vaccines. Total* .. 57

I. *Specific gravity of blood on admission.*

1056	.. 1 case	1063	.. 7 cases
1057	.. 2 cases	1064	.. 11 ,,
1058	.. 8 ,,	1065	.. 3 ,,
1059	.. 2 ,,	1066	.. 3 ,,
1060	.. 7 ,,	1070	.. 1 ,,
1061	.. 6 ,,		
1062	.. 6 ,,		

II. *Age incidence.*

5-10 years	4	31-35 years	.. 8
11-15 ,,	3	36-40 ,,	.. 4
16-20 ,,	10	41-50	.. 1
21-25 ,,	.. 13	51-60 ,,	.. 2
26-30 ,,	.. 10	61-70 ,,	.. 2

III. *According to religion and sex.*

Hindus	48	Males	42
Mahomedans	9	Females	.. 15

IV. *Complications encountered.*

(1) Uraemia..4 cases, all died.

(2) Suppression of urine for

	Cases.	Cured.	Died.
12 hours after admission	1	all	..
24 hours after admission	10	,,	..
36 hours after admission	11	,,	..
48 hours after admission	4	,,	..
60 hours after admission	2	,,	..

(3) Tympanitis..8 cured, 8 died.

(4) Oedema of lungs..1 case, died.

V. *Quantity of vaccine administered.*

Vaccines were given intramuscularly in doses of 2-4 c.c. at intervals of 6-10 hours for 3-4 doses.

Conclusion.

(1) The Cholera "carrier" seems to us to be the most important factor in epidemiology. The causation of seasonal variations needs further investigation.

(2) Toxic strains are more frequently isolated in the beginning of an epidemic. Most of these strains are haemolytic.

(3) In spite of the fact that Cholera is a manifestation of toxaemia from toxins absorbed from the intestines, the study of specific therapeutic agents, such as anti-cholera serum or vaccine, has not received as much attention as it deserves. Earlier in our work ([2]) and ([3]) we found the serum of convalescent patients to posses a higher bacteriolytic power than commercial anti-cholera serum. The administration of convalescent serum to toxic cases also showed better results than the latter. The administration of commercial anti-cholera serum has shown good results in mild cases, as well as in treating complications due to mild toxaemia. The use of concentrated sera also showed better results than unconcentrated serum. From these, it appears to us that better results are expected in treating toxic cases, where the routine saline transfusion often fails, by the administration of anti-cholera serum of sufficiently high titre. The improvements initiated by Hahn and Hirsch ([5]) to improve the toxin production of a strain have gone a step further, but it seems

to us that unless we get a highly toxic strain, like the Park No. 8 in Diptheria, we shall not probably get a serum where the anti-toxic unit will be contained in a much smaller quantity of serum than now. It will be seen that we have used fairly high doses of serum without expected results. On the other hand, we are incliued to think that the intravenous administration of large quantities of serum is not often well borne by patients. Attempts should be made, therefore, to test the toxicity of each strain of Koch's vibrio isolated during the earlier part of epidemics in those countries where epidemic outbreaks occur.

(4) Regarding the position of sensitised vaccines in the treatment of Cholera, we think they do not do any harm to patients but we are not in a position to declare that their administration is a distinct advancement in therapy.

(5) We have not had the opportunity of testing the efficacy of the Bacteriophage in the treatment of Cholera.

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Studies on the Periodicity of Defective Function of Human System as Distributed in the Phasial Cycle of the Moon

Part III

H. CHOWDHURY, M.Sc., M.B.
Rangoon.

Experiment 7.

The next group of experiments were undertaken to study the function of liver as regards carbohydrate metabolism.

Blood-sugar estimation of 10 individuals (Bengalees and up-country Indians) was done, after 14 hours fasting as before, continually for a period of 15 days, just one-half of a lunar cycle ; also in some cases after the full moon and in others after the new moon. The method adopted was that of MacLean. (See Chart 8)

From these it can be seen that, as stressed by the Indian sages, the 11th and the 15th days are *hypoglycaemic days* and it is in these days that they have restricted the diet. So this hypoglycaemic condition probably does not mean the most efficient action of liver as regards *glycogenesis*. It may be due to deficient absorption and retention of glucose in the tissues.

In case of Dr. Chowdhury and Mrs. X. the blood used to be kept for 2 hours in 15% Sod. sulph. solution for 2 hours before the estimation was actually undertaken. Hence the likeliness of *glycolysis* before actual determination was made and consequence low figures. But low fasting figure such as .058% was also obtained though the estimation of blood in some cases was made immediately after withdrawal.

The grand mean percentage of Blood sugar found was .096.

Experiment 8.

Glucose tolerance tests on these days (supposed defective functionating days) were done. It was conclusively shown that on these days the carbohydrate metabolism was at fault, as hyperglycaemia persisted even after 2 hours. (Sugar estimation by MacLean's method).

These experiments show beyond doubt the truth of the saying of the Hindu sages as regards fasting on the 10th of waxing and waning days. It may also be pointed out that the special restriction has been advocated as regards starchy food like rice etc., though in unavoidable cases fruits and milk were allowed.

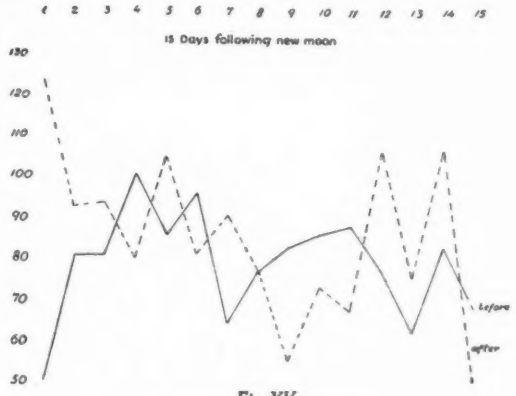

Fig XV
Blood sugar curve—Narayana

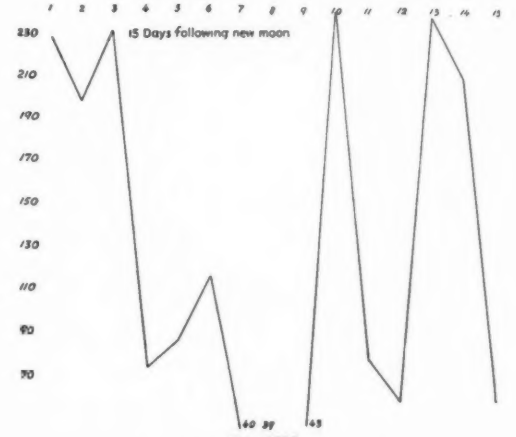

Fig XVI
One hour urine curve—Narayana

Experiment 9.

In this solitary experiment the man was given 500 c.c. of water with 50 grams glucose after 14 hours fasting (MacLean's method).

Blood sugar was estimated immediately before and after one hour of the feed. (See chart 9 and Fig. XV). Urine was also collected after an hour. (See Chart 9 and Fig. XVI).

CHART 8.

Percentage of Blood Suger (MacLean Method) in Men fasting for 14 *hours.*

15 days following either New or Full Moon days.

Full or New Moon	Name.	Age.	Sex.	Date.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Remarks.
New Moon	Lalbaboo Singh ..	22	Male	18-8-28 to 21-8-28	.144	.143	.118	.112	.101	.120	.132	.130	.137	.139	.104	.138	.131	.119	.128	Blood taken at 9 a.m. estimated at once.
New Moon	Mrs. X. ..	25	Female	18-8-28 to 31-8-28	.076	.075	.064	.058	.041	.052	.084	.083	.085	.075	.057	.082	.071	.063	.066	Blood taken at 6-30 a.m. estimated at 9 a.m.
Full Moon	Mr. Day ..	20	Male	1-9-28 to 14-9-28	.087	.112	...	.075	.113	.104	.099	.096	.100	.111	.109	.109	.109	.100	.104	Blood taken at 10 a.m. estimated at once.
Full Moon	Dr. H. Chowdhury ..	32	Male	1-9-28 to 14-9-28	.077	.069	...	.071	.111	.083	.061	.084	.077	.083	.032	.069	.062	.026	..	Blood taken at 6 a.m. estimated at 9 a.m.
New Moon	Lalbaboo Singh ..	22	Male	15-9-28 to 28-9-28	.137	.141	.133	.138	.144	.163	.142	.140	..	.150	.131	.143	.151	.139	..	Blood taken at 9 a.m. estimated once.
Full Moon	Dr. H. Chowdhury ..	32	Male	30-9-28 to 13-10-28	..	.100	.106	.109	.100	.105	..	.101	.106	.094	.110	.105	.079	.108	.103	Blood taken at 6 a.m. estimated at 9 a.m.
Full Moon	Mr. H. N. Das ..	20	Male	30-9-28 to 13-9-28	.105	.058	.123	.093	.093	.102	..	.092	.100	.112	.095	.107	.081	.086	.096	Blood taken at 9 a.m. estimated at once.
New Moon	Mr. Dey ..	20	Male	14-10-18 to 28-10-28	.093	.093	.087	.100	.092	.095	.106	.105	.095	.086	.095	.106	.094	.093	..	Blood taken at 9 a.m. estimated at once.
New Moon	Saidu (cane sugar) ..	22	Male	17-7-31 to 29-7-31	..	.044	.083	.093	.108	.085	..	.094	.093	.093	.097	.064	.085	.081	.093	1 hour after 50 grams cane sugar with 100 c.c. of water.
New Moon	Narayan Before ..	20	Male	12-10-31 to 26-10-31	.050	.081	.081	.101	.086	.096	.064	.077	.083	.086	.088	.077	.062	.083	.068	Before and one hour after 50 grams. Glucose with 500 c.c. water.
	After ..				.124	.093	.094	.080	.105	.081	.091	.077	.055	.073	.067	.106	.075	.106	.050	

From the study of the charts it will be found that in the 8th, 13th and 15th days there is a likelihood of slow absorption and transfer of glucose to tissues.

(Urea concentration test also shows similar phenomena).

Experiment 10.

To determine the possible cause of such phenomena simultaneous estimations of blood sugar and sugar of tissue fluids were done in 3 patients with massive œdema. (Venous blood sample was taken though the method of estimation was that of Mc Lean). (See chart 10).

These conclusively show the retention of sugar in the tissues on these days specially when the cells are almost dying.

These agree well with the findings of the sages that on these days the cells cannot act normally. Hence the likeliness of diminished absorption from the intestine and retention in the tissues.

Tissue fluid in all these cases had proteins in colloidal state in them, which was precipitated by colloidal iron, the determination of sugar was to be done after filtration only by McLean's method.

CHART 9.

Glucose Talerance Test Percentage of Blood Sugar and quantity of urine

Narayan (12-10-31 to 20-10-31.) Male age—20.

15 DAYS following new Moon day.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sugar % in blood after fasting ..	.050	.081	.081	.101	.086	.096	.054	.077	.083	.086	.088	.077	.062	.083	.068
% of sugar 1 hour after taking 500cc. % of sugar 1 hour after taking 500 cc. of water with Glucose (50 grms). ..	.124	.093	.091	.080	.105	.081	.091	.077	.055	.073	.057	.106	.075	.106	.050
Urine in cc. after 1 hour of taking 500 cc. of water ..	232	198	230	77	84	114	39	35	43	243	75	56	234	206	54

CHART 10.

A.	B.	C.
CIRRHOSIS LIVER.	T. B. PATIENT.	CASE OF BERI BERI.
M. A. Dass age 40.	Mr. Thenbar age 38	Mr. Apana age 35.
Œdema all over the body specially marked in the legs.	Œdema all over, marked in the legs.	Œdema all over very marked in the legs.
Takes a cup of tea every morning at 8-0 A.M.	Tea and bread every morning at 8 A.M.	Blood and T. F. taken before he took anything at 7-30 A.M.
Died on the night of 11-4-31.	Died at 3 A.M. on 16-4-31.	Died on the night of 14-9-31.

	Days following Full Moon				Days following Full Moon			Days following New Moon			
	6	7	8	9	10	12	13	14	*	1	2
Blood Sugar	.276	.195	.238	.183	.085	.137	.106	.096	.074	.092	.080
Tissue fluid sugar	.267	.208	.216	.263	.113	'085	.100	.096	.101	.076	.094

DATE.	8-4-31. Blood taken at 9 a.m.	9-4-31. Blood at 9-10 a.m.	10-4-31. Blood at 8-30 a.m.	11-4-31. Blood at 8-30 a.m.	12-4-31. Blood taken at 10 a.m. intense œdema.	14-4-31. Blood at 10 a.m. very intense œdema.	15-4-31. Blood at 10 a.m œdema little less.	11-9-31. Blood at 7-30 a.m. Dyspnœa.	12-9-31. Blood at 7-30 a.m. Dyspnœa.	13-9-31. Blood at 7-30 a.m. Dyspnœa.	14-9-31. Blood at 7-30 a.m. intense dyspnœa.

Experiment 11.

Nitrogen partition (urine) : { *%urea N.* / *% total N.*

The former was determined by the *urease* and the latter by the *Kjeldahl* method.

This experiment has been done on 3 men with similar preliminary treatment. Urinary nitrogen co-efficients were determined. (See charts 11, 12 and 13). Here also there is a clear indication of defective liver function on or about the 8th 13th and the 15th day in the phasial cycle of the moon.

As the normal co-efficient vary between 85-90 deficiency is indicated when it goes so low as 45. So there is the justification of not taking meat on the 8th, 13th and the 15th day of the waxing and waning of the moon.

CHART 11

24 hours' Urine showing Nitrogen Partition.

Lalbaboo Sing—Age 22 yrs.

Date.	Total Nitrogen.	Urea & Ammonia Nitrogen.	Ammonia Nitrogen.	Nitrogen Coefficient.	Total Urine.	Days following Full Moon.
30-11-28 ..	891.8	644.0	115.36	59.0	640	3
1-12-28 ..	603.4	506.8	57.4	74	1102	5
2-12-28 ..	..	..	..	..	1077	6
3-12-28 ..	553	306.6	59.92	44	1093	7
4-12-28 ..	709.8	386.4	106.96	39	875	8
5-12-28 ..	578.2	428.04	64.4	62	1197	9
6-12-28 ..	716.8	352.8	23.24	45	1012	10
7-12-28 ..	863.8	708.4	115.08	68	778	11
6-12-28 ..	775.6	640.2	68.6	74	840	12
9-12-28 ..	558.6	476.0	56.56	76	1285	13
10-12-28 ..	842.8	681.8	82.6	71	767	14
11-12-28 ..	1104.6	897.4	138.04	68	639	14
12-12-28 ..	1323.0	947.8	123.2	62	550	New Moon.
12-12-28 ..	901.6	743.4	120.4	69	675	1
14-12-28 ..	814.8	639.8	72.52	69	852	2
15-12-28 ..	1257.2	987.0	127.96	69	475	3

CHART 12

Nitrogen Partition of 2nd Sample [2nd ½ hour] after taking 500 c.c. of Watar.

Date.	Total Nitrogen.	Urea & Ammonia Nitrogen.	Ammonia Nitrogen.	Nitrogen Coefficient.	Two hours Urine after taking 500 cc. Water.	Days following New Moon.
19-11-28 ..	277.2	224.0	31.6	69	..	7
20-11-28 ..	312.2	242.2	35.56	66	..	8
21-11-28 ..	224.0	193.2	32.74	71	..	9
22-11-28 ..	235.2	210.0	31.36	76	..	10
23-11-28 ..	..	..	..	..	..	11
24-11-28 ..	..	..	..	..	..	12
25-11-28 ..	..	..	..	..	..	13
26-11-28 ..	243.6	224.0	35.56	77	..	14
27-11-28 ..	112.0	9.2	1.68	82	..	Full Moon.

Experiment 12.

Skin resistance tested in 3 patients (healthy) by electro-cardiographic methods. (See Chart 14).

Here also we have a clear indication of the existence of currents of opposite nature in the body on these days as compared with other days.

Experiment 13.

Basal metabolic rate.

In this experiment the patient, a healthy man of 36 years, weight 106 lbs., height 5 ft. 5″, was made to fast for 12 hours from 6 P.M. previous evening to 6 A.M. next morning. After attendance to nature's call on rising from his bed he was made

CHART 13

Nitrogen Partition of first ½ hour's Urine after 500 c. c. of Water at 6 A. M.

Dr. Chaudhury. Age 32 years.

Date.	Total Nitrogen.	Urea and Ammonia Nitrogen.	Ammonia Nitrogen.	Nitrogen Coefficient.	Two hours Urine after taking 500 cc. Water.	Days following Full Moon.	Remarks.
30-10-28 ..	204.4	154.28	13.72	68	557	2	
31-10-28 ..	221.2	169.4	14.84	61	514	3	
1-11-28 ..	..	170.8	11.2	..	474	4	
2-11-28 ..	191.6	137.2	6.44	67	624	5	
3-11-28 ..	176.4	118.8	..	64	494	6	
4-11-28 ..	..	..	..	..	571	7	
5-11-28 ..	455	382.2	40.8	77	393	8	
6-11-28 ..	170.8	135.8	8.12	74	584	9	
7-11-28 ..	352.1	287.0	17.08	76	413	10	
8-11-28 ..	163.8	134.4	8.4	76	562	11	
9-11-28 ..	193.2	152.6	15.12	71	495	12	
10-11-28 ..	380.8	329.0	40.6	76	441	13	
11-11-28 ..	..	..	..	..	435	14	Nitrogen partition of a sample obtained after last micturition two hours after taking 500 cc. of water.
12-11-28 ..	383.6	221.2	78.4	37	498	New Moon.	
13-11-28 ..	410.2	295.4	48.08	62	413	1	At 9-30 A.M. 491.4, 395.8, 51.8 59. On the same day Nitrogen partition of sample of urine after meal. T.N., U.N., A.N. A.N., N.C.
14-11-28 ..	291.2	233.8	35.0	68	512	2	
15-11-28 ..	312.2	266.0	35.0	71	470	3	
16-11-28 ..	274.4	217.8	36.1	77	560	4	
							At 12.30 P.M. 617.4, 4102, 49.56 58.
17-11-28 ..	298.2	263.2	32.76	77	519	5	On the same day after meal the nitrogen partition of a sample of urine T.N. U.N. A.N. N.C.
18-11-28 ..	..	..	..	..	..	6	
19-11-28 ..	634.2	571.2	65.8	79	533	7	At 9-30 A.M. 583.8, 453.6, 59.92, 67.
20-11-28 ..	638.4	539.0	56.0	75	453	8	
21-11-28 ..	551.6	351.4	37.8	56	581	9	
22-11-28 ..	558.6	420.8	47.6	66	491	10	
23-11-28 ..	653.8	548.8	48.52	76	437	11	
24-11-28 ..	611.8	450.8	54.32	64	..	12	This sample was taken before taking water.
25-11-28 ..	..	..	..	..	..	13	
26-11-28 ..	653.8	516.6	57.96	70	512	14	
27-11-28 ..	439.6	380.8	20.44	82	509	Full Moon	
3-12-28 ..	533.4	449.4	19.88	80			
4-12-28 ..	561.2	471.6	33.6	78			
5-12-28 ..	354.2	327.6	25.76	85			
6-12-28 ..	..	..	..	..			
7-12-28 ..	693.0	593.6	44.29	97			
8-12-28 ..	434.0	368.2	36.4	76			
10-12-28 ..	533.0	473.2	41.72	80			
11-12-28 ..	540.4	474.6	28.0	82			
12-12-28 ..	627.2	477.4	34.72	70			

CHART 13 (*Continued.*)

NITROGEN PARTITION OF first ½ an hour after taking 500 cc. of water. Days following New Moon.

19-11-28 ..	401.8	310.2	49.56	72	..	7	
20-11-28 ..	344.4	296.8	40.14	71	..	8	
21-11-28 ..	296.8	211.4	31.11	59	..	9	
22-11-28 ..	357.0	308.0	49.0	72	..	10	
23-11-28 ..	308.0	285.6	39.2	79	..	11	
24-11-28 ..	259.0	235.2	35.56	77	..	12	
26-11-28 ..	280.0	249.2	77.70	61	..	14	
27-11-28 ..	145.6	99.4	2.8	66	..	Full Moon	
28-11-28 ..	366.8	274.4	19.60	69	437	1	Days following Full Moon.
29-11-28 ..	197-4	168.0	15.12	77	566	2	
30-11-28 ..	247.8	180.6	2.88	67	577	3	
1-12-28 ..	207.2	1551	9.24	70	578	5	
3-12-28 ..	207.2	182.0	7.28	84	558	7	
4-12-28 ..	267.4	247.8	11.7	88	521	8	
5-12-28 ..	201.6	233.8	21.84	105	441	9	
6-12-28 ..	271.6	246.4	15.72	85	516	10	
7-12-28 ..	144.2	128.8	11.2	81	544	11	
8-12-28 ..	189.0	149.8	12.04	72	564	12	
10-12-28 ..	165.2	141.4	8.4	80	562	14	
11-12-28 ..	135.1	42	4.8	29	639	14	
12-12-28 ..	180.6	22.4	8.8	9	487	New Moon.	

CHART 14

Deflection of fibre due to skin current [*in centimetres*] *to the left or right of Zero position in* 3 *subjects, from* 3-2-31 *to* 17-2-31.

Days following Full Moon.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pontaya	3.0L	0.9L	1.5L	1.4R	1.9L	1.5L	1.0L	1.R	0.4L	0.8L	0.2R	0.8L	1.0R	0.1R	0.5R
Poke	0.5L	5.0R	0.4R	1.4R	2.0L	1.2R	1.7R	1.4R	1.2R	1.8R	0.5R	2.0L	0.2R	1.4L	0.5L
Abbas	2.2L	3.5L	3.4L	2.7L	4.3L	2.5L	4.0R	0.5L	5.0L	3.5L	1.2L	2.5L	3.2L	2.4L	1.8L
Pontaya	7.7L	6.0L	2.4L	0.2L	3.9L	5.0L	4.0L	2.8L	3.4L	1.4L	2.0L	3.2L	3.2L	0.8R	2.5L
Poke	2.1L	3.3R	0.0	0.7L	3.0L	2.6R	1.2R	1.4R	0.3R	2.4R	0.1R	3.5L	3.0L	5.0L	4.5L
Abbas	4.1L	1.0L	5.8R	70.L	7.5L	1.7R	0.7R	1.0R	7.0L	3.5R	1.0L	5.5L	4.0L	4.0L	2.0L
Pontaya	5.5L	3.1L	0.2R	1.7L	3.6L	2.0L	1.8L	3.3L	1.3L	0.2L	0.6L	1.0L	2.5L	0.8R	3.0L
Poke	1.5L	2.9L	0.8L	2.4L	1.0L	1.5R	0.6R	0.2R	1.0L	0.5R	2.6R	1.5L	3.5L	3.5L	4.5L
Abbas	2.4L	0.5R	4.5R	2.2L	3.5L	4.5R	2.7R	0.5L	0.2L	6.5R	3.2R	2.5L	2.5L	2.3L	0.3L

to lie down again. The W. C. was attached to the bed room. His previous meal used to be one consisting of *rice, ruti, fish, meat* and *egg* in different combination on different days.

The idea of keeping him on liberal diet was to avoid monotony and keep him as much as possible in natural state. Though a liberal choice was given yet moderation was adhered to. The expired air was collected in Douglas' bag for a period of 5 minutes and 3 well mixed samples were analysed by Harris's gas analysis apparatus and the mean was taken.

The rate of oxygen consumption has been calculated for a period of more than a lunar month (See Chart 15) and details of various food combinations have also been shown.

This lends a very strong support to ideas of the Hindus of fasting during these days. The highest rate of oxygen consumption during this period was a little over 200 c.c. per minute and the lowest figure was a little over 120 c.c. per minute.

The average consumption was 161 c.c. per minute.*

(*To be continued*).

* It is true that the term *Basal* is not accurate here, However, as the experiment has been undertaken only for comparative value it does not matter very much.

CHART 15

Basal Metabolism Estimation

Dates.	Composition of Expired air.	Corrected % of O_2 in inspired ait.	R. Q. CO_2/O_2	Volume of Expired air.	Pressure.	T.	Corrected volume of expired air.	Consumption of O_2 per minute.	Previous Diet and Exercise.
	CO_2 = 3.9 %		3.9						
28-7-32	O_2 = 16.55 =	O_2 = 20.52	———	21.161 litre.	755.69 m	25.72	18.86 litre	149.9 c.c.	
	N_2 = 79.55 =								
	CO_2 = 3.84		3.84						
29-7-32	O_2 = 17.05	O_2 = 20.54	———	22.113 „	755.1 „	25.4	19.475 „	131.0 „	
	N_2 = 79.15		3.37						
	CO_2 = 3.7 =		3.7						
30-7-32	O_2 = 16.65 %		———	19.514 „	755.13	26.00c.	17.08 „	133.0 „	
	N_2 = 79.65 %		3.89						
	CO_2 = 3.4 %		3.4	..					
31-7-32	O_2 = 16.75 =	O_2 = 20.60	———	..	756.2 „	26.1	..	..	
	N_2 = 79.85 %		. 3.65						
	CO_2 = 4.05 %		4.05						
1-8-32	O_2 = 16.35 =	O_2 = 20.53	———	19.987 „	753.83	26.2	17.476	146.0 „	
	N_2 = 79.6 =		4.18						
	CO_2 = 3.8 %		3.8						
	O_2 = 16.6 =	O_2 = 20.53	———	20.158 „	753.73	25.5	17.795	136.3	
	N_2 = 79.6 =		3.83						
	CO_2 = 3.65 %		3.65						
3-8-32	O_2 = 17 %	O_2 = 20.47	———	20.932 „	754.6	26.05	18.432	128.0	Fish curry and ruti, walking.
	N_2 = 79.35		3.47						
	CO_2 = 4 %		4						
4-8-32	O_2 = 16.7 %	O_2 = 20.46	———	20.311 „	754.89	25.6	20.961	158.6	Egg curry and ruti, no exercise.
	N_2 = 79.3 %		3.76						
	CO_2 = 3 %		3						
5-8-32	O_2 = 16.3 %	O_2 = 20.82	———	20.907 „	756.26	25.6	18.394	166.0	Prawn curry and ruti, moderate indoor exercise.
	N_2 = 80.7 %		4.52						
	CO_2 = 3.2 %		3.2						
6-8-32	O_2 = 15.9 %	O_2 = 20.87	———	20.726 „	755.37	25.05	18.703	185.9	Egg curry and ruti, moderate indoor exercise.
	N_2 = 80.9 %		4.97						
	CO_2 = 3.45 %		3.45						
7-8-32	O_2 = 16.85 %	O_2 = 20.56	———	..	755.03	24.72	..	..	
	N_2 = 79.7 %		3.71						
	CO_2 = 3.58 %		3.58						
8-8-32	O_2 = 16.85 %	O_2 = 20.52	———	19.628 „	756.47	24.38	17.395	127.6	Hilsa fish curry and ruti, no exercise.
	N_2 = 79.57 %		3.67						
	CO_2 = 3.45		3.45						
9-8-32	O_2 = 19.6	O_2 = 20.54	———	20.342 „	757.7	25.8	17.917	122.4	Meat curry and rice, moderate exercise.
	N_2 = 79.65		3.64						
	CO_2 = 3.6 %		3.6						
10-8-32	O_2 = 16.85 %	O_2 = 20.52	———	22.342 „	765.33	25.1	19.716	144.7	Prawn curry and ruti, moderate exercise.
	N_2 = 79.55 %		3.67						
	CO_2 = 3.85 %		3.85						
11-8-32	O_2 = 16.95 %	O_2 = 20.43	———	22.952 „	756.12	26.05	20.149	140.2	Dal and ruti moderate, exercise
	N_2 = 79.2 %	O_2 = 20.43	3.48						
	CO_2 = 3.54 %		3.54						
12-8-32	O_2 = 17 %	O_2 = 20.5	———	20.3490 „	756.66 m.m	26°.94 c.	17.788 „	124.5 c.c.	Meat curry rice.
	N_2 = 79.46		3.5						
	CO_2 = 3.8 %		3.8						
13-8-32	O_2 = 16.95 %	O_2 = 20.46	———	23.494 „	755.69 „	25.16 „	20.712 „	147.4 ,	Dal and ruti milk.
	N_2 = 79.3 %		3.56						

CHART 15 (*Contd.*)

Dates.	Composition of Expired air.	Corrected % of O_2 in inspired ait.	R. Q. CO_2/O_2	Volume of Expired air.	Pressure.	T.	Corrected volumo of expired air.	Consumption of O_2 per minute.	Previous Diet and Exercise
14-8-32	CO_2 = 3.8% O_2 = 15.85% N_2 = 80.35%	O_2 @ 20.72	3.8 3.87	20.206 „	754.86 „	27.3 „	17.571 „	135.9 „	Meat and ghee made sweets.
15-8-32	CO_2 = 3.95% O_2 = 16.1% N_2 = 79.95%	O_2 @ 20.62	3.95 4.52	19.975 „	755.82 „	27.11 „	17.429 „	157.5 „	Prawn curry and rutil
16-8-32	CO_2 = 3.64% O_2 = 16.59% N_2 = 79.77%	O_2 = 20.58	3.64 3.99	22.235 „	757.26 „	28.27 „	17.319 „	138.2 „	Dal and ruti and milk.
17-8-32	CO_2 = 3.5% O_2 = 17.15% N_2 = 79.35%	O_2 = 20.47	3.5 3.32	21.6000 „	757.26 „	27.27 „	21.492 „	142.7 „	Prawn curry ruti and milk.
18-8-32	CO_2 = 3.8% O_2 = 16.6% N_2 = 79.6%	O_2 = 20.53	3.8 3.93	23.698 „	757.11 „	27.27 „	20.666 „	162.4 „	Dal, ruti and milk.
19-8-32	CO_2 = 3.96% O_2 = 15.85% N_2 = 80.19%	O_2 = 20.68	3.96 4.83	21.296 „	755.87 „	27.11 „	18.579 „	179.4 „	Egg curry ruti and milk.
20-8-32	CO_2 = 3.65% O_2 = 16.1% N_2 = 80.25%	O_2 = 20.70	3.65 4.6	23.655 „	757.12 „	27.22 „	20.662 „	190.0 „	Meat curry and rice.
21-8-32	CO_2 = 3.55% O_2 = 15.85% N_2 = 80.6%	O_2 = 20.79	3.55 4.94	21.001 „	757.9 „	28.05 „	18.281 „	180.6 „	Egg curry and rice, slept at 12 (midnight Hot.)
22-8-32	CO_2 = 3.3% O_2 = 16.3% N_2 = 80.4%	O_2 = 20.71	3.3 4.44	25.284 „	756.83 „	29.05 „	21.856 „	194.3 „	Hilsa fish, rice, fruits and sweets, Hot night
23-8-32	CO_2 = 3.4% O_2 = 16% N_2 = 80.6%	O_2 = 20.79	3.4 4.79	24.831 „	756.47 „	28.8 „	21.477 „	205.7 „	Fish and rice, moderate exercise hot, night.
24-8-32	CO_2 = 3.65% O_2 = 16.3% N_2 = 80.05%	O_2 = 20.65	CO2 = 3.65 O2 = 4.35	23.374 „	756.4 „	29.61 „	20.161 „	175.6 „	Fish and rice, walking, hot night
25-8-32	CO_2 = 3.45% O_2 = 16.55%	O_2 = 20.64	3.45 4.09	24.599 „	755.75 „	29.61 „	20.297 „	174.2 „	Fish and rice, very hot night.
26-8-32	CO_2 = 3.5% O_2 = 16.6% N_2 = 79.9%	O_2 = 20.61	3.5 4.01	25.404 „	756.12 „	28.8 „	21.966 „	176.0 „	Fat meat, rice, moderate exercise, hot night
27-8-32	CO_2 = 3.55% O_2 = 16.3% N_2 = 80.15%	O_2 = 20.67	3.55 4.47	25.428 „	755.92 „	28.3 „	22.042 „	197.0 „	Prawn curry and rice (Maryngitis) cool night.
28-8-32	CO_2 = 3.75% O_2 = 15.8% N_2 = 80.42%	O_2 = 20.74	3.75 4.94	23.031 „	756.52 „	27°.5 „	20.074 „	198.1 „	Egg, fish and rice, cool night.
29-8-32	CO_2 = 3.5% O_2 = 16.4% N_2 = 80.1%	O_2 = 20.66	3.5 4.26	25.873 „	757.03 „	26.1 „	22.730 „	193.6 „	Dal and rice, very cool night.
30-8-32	CO_2 = 3.7% O_2 = 16.4% N_2 = 80.35%	O_2 = 20.72	3.7 4.77	22.239 „	756.96 „	28.16 „	19.324 „	184.3 „	Meat and rice, walking, cool night.
31-8-32	CO_2 = 3.65% O_2 = 16.08% N_2 = 80.27%	O_2 = 20.70	3.65 4.62	22.707 „	756.53 „	27.4 „	19.75 „	182.4 „	Prawn and rice sweets, cool night.
1-9-32	CO_2 = 3.55% O_2 = 16.7% N_2 = 79.75	O_2 = 20.57	3.55 3.87	24.542 „	756.59 „	25.1 „	21.573 „	166.9 „	Dal and rice, walking.

On the Utility of Using A Glycerine Tellurite Medium in the Routine Bacteriological Examination of Throat for Diagnosis of Diphtheria.

CHARU CHANDRA BASU.
Calcutta.

Since the introduction of *tellurium* salts in the diagnosis of diphtheria by CONRADI and TORCH, many new media have been introduced from time to time for differentiating *diphtheria bacilli* from other organisms found in the threat. Of these the one recommended by DOUGLAS is the simplest. The preparation of this medium and its advantages are fully dealt with in the monograph on diphtheria, published by the *Medical Research Council* (1). ALLISON and AYLING (2) modified this medium by adding copper sulphate as an inhibitor of certain organisms, like *staphylococci, streptococci, pneumococci* etc. CLAUBERG (3) and ANDERSON and his co-workers (4), substituted whole blood in place of *trypsinised serum*. The preparation of all these media, except that of DOUGLAS, is rather difficult and can only be done in special laboratories engaged in diphtheria work only.

For the last 9 years I have been using a *glycerine egg agar* containing *tellurite* with very satisfactory results. It is essentially a 2% glycerine agar medium, enriched by the addition of the yolk of an egg per 200 c.c. of the medium. The amount of tellurite to be added is found out by experiment, as all the available brands are of different strength and leave a fairly large amount of residue. A one per cent. solution is made and autoclaved at 110° C. The supernatant fluid is added in the proportion found out by trial, along with the yolk of egg to the glycerine agar base at about 45°C. mixed thoroughly. The finished medium is then poured into sterile tubes slanted and used after 24 hours' incubation. Before use each batch is tested with cultures of *diphtheria* and *Hofmann bacilli* to see that their growth is not unduly inhibited. In this medium the diphtheria bacilli and diphtheroids show themselves as dark colonies in 12 to 48 hours. *C. Hofmanni* takes a little more time to develop the dark colour than *C. diphtheriae*. But the characteristic reaction of the former on this medium is usually seen after 48 hours though some showed it after 24 hours. The portion of the medium immediately under the colony takes a dark colour, which gradually diffuses into the whole of the medium and in 3 or 4 days the medium becomes jet black while diphtheria bacilli form dark colonies without blackening the medium. This reaction, at first, appeared to me curious, as I could not find any such change noted by other observers working with the various tellurite media. After various experiments I found that the glycerine in the medium made all this difference, as the characteristic reaction of *C. Hofmannii* was not seen when I used egg tellurite medium without glycerine, while *Douglas' medium* prepared with the addition of glycerine, showed the same darkening. I next procured from the National Collection of Type Cultures, representative group strains of *Corynebacteria* permanently maintained in their collection as also three strains of *C. diphtheriae* (Parke No. 8, Horse D.34 and Gentry) and a strain of *C. Hofmannii* (Wellenhof No. 231) but none of these organisms except *C. Hofmanni* (Wellenhof) gave the reaction. In order to test whether this was a vital reaction or due to changes produced in the medium, four 2% glycerine broth tubes were inoculated with *C. diphtheriae* and *C. Hofmannii* and incubated for three days and two of these were heated for half an hour at 60°.C and the other two left as controls. Two drops of a stock tellurite solution were added to each of the tubes and incubated for two days. The heated tubes remained free from any colour, the unheated tube containing *C. diphtheriae*, showed a dark granular deposit of intravitally stained bacilli, while the unheated tube containing *C. hofmannii* showed a dark granular deposit as also a deep blackening of the medium.

In this connection I would like to observe, that *C. hofmannii* have not got clear cut specific characters as *C. diphtheriae*. They have been described as short straight stunted oval rods, with rounded ends. They are broader in proportion to their length and possess single median unstained

septa. "The absence of reactions on carbohydrates forms a sharp line of distinction between *C. hofmannii* and all other diphtheriods but from these negative characters, *C. hofmannii* is not to be regarded as a throughly determined species". (5) For purposes of this paper, I have given the name of *C. hofmannii* to all those diphtheroids found in the throat, which form short stunted rods, with very little tendency to form metachromatic granules, and which do not ferment glucose and sucrose. It is this particular type of organism, which produces blackening in the glycerine tellurite medium. This type of organism is very rarely found in other parts of the body. Only lately I came across such an organism in a sample of urine, it was a non-fermenter and blackened the medium. It seems that this property of blackening the medium is seen in recently isolated culture but is lost after prolonged subculture as my standard strain of *Hofmann's bacillus* from the National Type Cultures (*C. hofmannii-Wellenhof No.* 231) has ceased to blacken the medium, though when originally brought out about a year and a half ago, it darkened the tellurite medium. Further my strain, Dj, isolated about one and half year ago, is no longer a vigorous black-producing strain. Two strains of *Hofmann's bacillus* from Prof. E. Pribram's *microbiologische Sammlung* (Pseudo-diphtheria bacillus, Auge and Tube) did not blacken the tellurite medium.

We will now briefly discuss the utility of tellurite media in general and the medium described in this paper in particular. Inspite of the claims of the sponsors of the various tellurite media, it is to be doubted whether they can replace the time honored *Loeffler's medium* or what I prefer to use, on account of the ease with which it can be prepared,-sheep blood agar, in the diagnosis of suspected cases of diphtheria. The characteristic morphology of the bacilli is seen earlier (6 to 12 hours) in serum or blood media than in the tellurite media. In my routine work I always use both blood agar and glycerine egg tellurite media, depending on the blood medium for rapid diagnosis and observing the other medium for 48 to 72 hours before giving a final report. The tellurite media are also likely to be of great use in Public Health Laboratories, where one has to examine convalescents, contacts and carriers, as the presence or absence of diphtheria and diphtheroids can be suspected by looking at the tubes. These showing no characteristic black colonies can be discarded. The special advantage of the *glycerinated tellurite medium* is that after 48 hours, we can rule out the *Hofmann bacilli*, by the peculiar blackening of the medium under the colonies. The only organisms, which simulate the *cerynebacteria*, are some *staphylococci*, which take a very dark colour but do not stain the medium and these can be easily identified by staining. After excluding the *Hofmann's bacillus* and the *staphylococci* there now remain the virulent and avirulent diphtheria bacilli and certain other diphtheroids. It is practically impossible to differentiate these on morphology alone and pure cultures must be obtained and sugar tests and animal inoculations done, before final diagnosis can be made.

The *glycerine tellurite medium* is an ideal medium for isolating diphtheria bacilli and diphtheroids. The suspected material is inoculated on a plate or on a series of starts and incubated for 48 hours. By this time the *corynebacteria* grow in characteristic colonies, and these are subcultured on agar and, if pure, tested with sugars and by animal inoculations.

Various media containing tellurite have been recommended from time to time by different workers. A simple tellurite medium containing egg yolk and glycerine agar is described. This medium, on account of the presence of glycerine, sharply differentiates *Hofmann's bacillus* from *diphtheria bacilli* and many other *diphtheroids*. The former stains the medium intensely black, while the latter do not. This medium when used along with a blood agar medium, prevents us from missing diphtheria bacilli, when their number is scanty. It is the medium of choice, when one has to deal with a large number of cases, as in the examination of convalescents, contacts or carriers. This medium is also of great use in isolating diphtheria bacilli and diphtheroids for further study.

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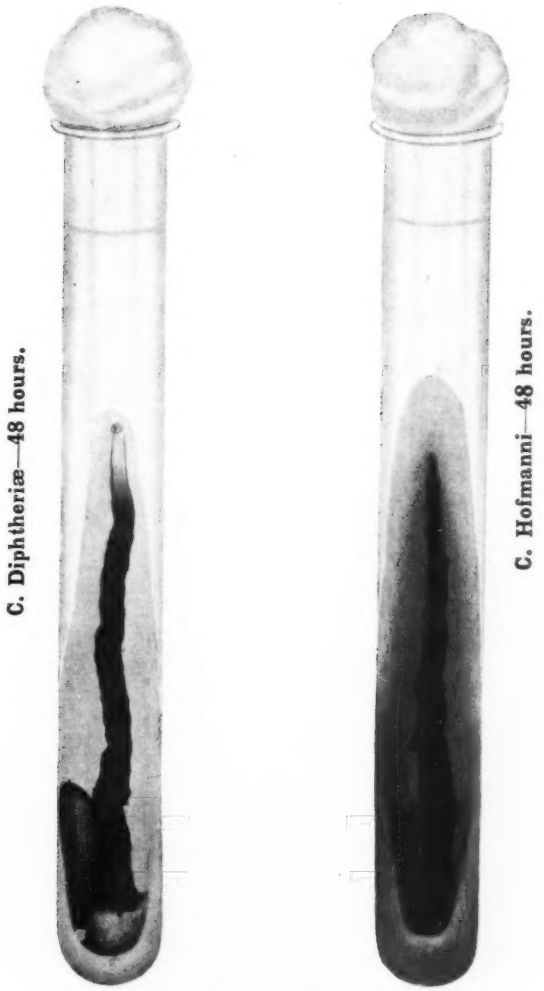


Bose : Glycerine-tellurite Media for C. Diphtheriæ and C. Hofmanni

Studies on the recent Epidemic of Cerebrospinal Meningitis in Calcutta (15-8-33 to 20-11-33).

A K. SEN, M.B., S. C. SEAL, M.B.,
MR. SAROJ BOSE AND B. C. DAS GUPTA, L.M.F.

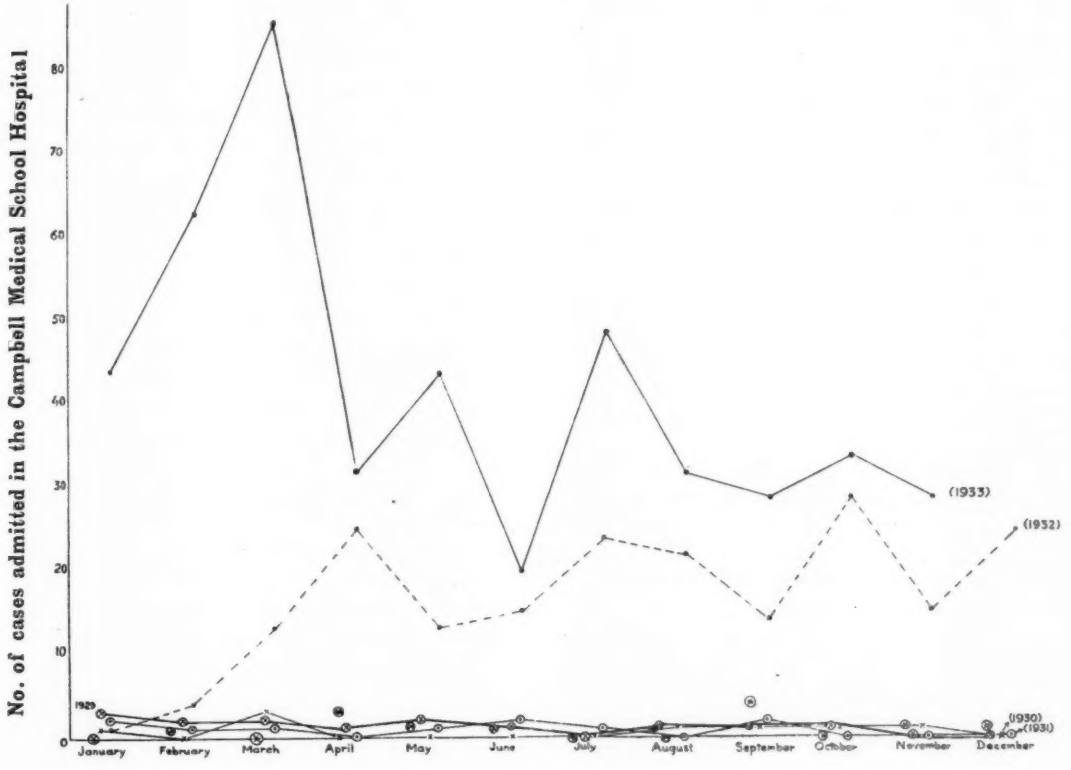
From the Laboratories of Biological Research and Experimental Therapy, Bengal Chemical & Pharmaceutical Works Ltd., Calcutta.

SEROLOGICAL TYPING OF THE MENINGOCOCCI ISOLATED.

A preliminary report.

We started our work on the bacteriology of the recent epidemic of cerebrospinal meningitis in Calcutta, with a view to collect suitable local strains of meningococci—antigenically "broad" and representatives of all the types present in the local epidemics for the active immunisation of horses, in the preparation of therapeutic sera—both antitoxic and antibacterial.

This is only a preliminary report on the serological typing of the strains, isolated during the period, 15-8-33 to 20-11-33, in relation to the usual four types of Gordon and Murray, by agglutination test only, with (1) Meningo. Type Sera, Standard Laboratory, Medical Research Council, Oxford, and (2) Diagnostic Serum (Rabbit) Meningococci, Division of Laboratories and Research, New York State Department of Health. Further studies on their absorptive properties and agglutinogenic capacities are going on and we hope to report from time to time the results obtained.



Of the seventyfive samples of cerebrospinal fluid, from fifty-seven cases clinically diagnosed as or suspected to be Cerebrospinal Meningitis, seventyfour were received from the Infectious Ward, Campbell Hospital, Calcutta, through the courtsey of Lt. Col. N. C. Kapur, Superintendent of the Hospital and Dr. A. N. Sen, Physician-in-charge of the Ward, the remaining one was from a private case. Each sample of the fluid, after its arrival at the laboratory, was incubated at 37°C. for about two hours, before its primary inoculation in several ordinary and special media for isolation. The primary cultures were done in (*a*) *Lowenthal Media*. (*b*) *Huntoon's Agar* and (*c*) *Special Glucose broth media*—pH 7.4-7.6. Strains after isolation and identification, are being maintained in Lowenthal Media by subculturing every alternate days and in Dorset's egg Media every week.

Altogether fortytwo different strains of Meningococci, one strain of pneumococci and two strains of gram positive diplococci were isolated. Of the fortytwo different strains of Meningococci, seven strains died before preliminary typing, the remaining thirtyfive strains were typed in relation to the four types of Gordon and Murray, by agglutination tests only (both microscopic and macroscopic), with the Type Sera, Standard Laboratory, Oxford, with the following results :—

(1) Eighteen of the strains were found to agglutinate strongly with Type I serum, seven of which did not show any cross agglutination with any other Type sea ; and ten faintly agglutinated with Type III serum and one with Type II and III.

(2) Seventeen remaining strains were found to agglutinate strongly with Type III serum, eight of which did not show any cross agglutination with any other Type sera but six gave faint agglutination with Type I serum and one with Type II serum and two with type IV serum.

Later on thirtythree of the above strains were again typed by agglutination test with Standard Type Sera from New York State Department of Health, and we were able to confirm our previous findings as regards the typings, excepting that some of the strains were found to show a tendency of "broadening" or "spreading antigenically."

Twentysix of these strains were recently typed again with Oxford Standard Type Sera by a macroscopic agglutination method described in "Approved Laboratory Technique" by Kolmer and Boerner (1931). Of these twentytwo showed no change in their type ; three of Type I changed to Type III., and one of Type III to Type I.

Thus, while typing the meningococci in our laboratory, had to face at least some of the difficulties experienced by Branham in America (1932), and we agree with her "that there are two main factors which complicate the satisfactory classification of meningococci the lack of Group specicity and the lack of Antigenic stability", and "in order to get a true indication of the nature of the strains involved in any given epidemic, it should be easier to 'type' them immediately after isolation as they tend to broaden more and more until they would overlap other groups. Sometimes this goes so far that the original group identity is hopelessly obscured—'degradation', which may take place very rapidly or very slowly, varying with the strain and with the condition under which it is kept."

By means of agglutination test it was possible to place all our strains of meningococci isolated, in Calcutta, during the period under review, in the Gordon-Murray types. Our results of the agglutination tests also showed that Type I, Type III, or "Type I or III", constituted mainly the epidemic strains of Calcutta during this period, not a single strain out of these thirtyfive belonged to Type II, Type IV, or "Type II or IV".

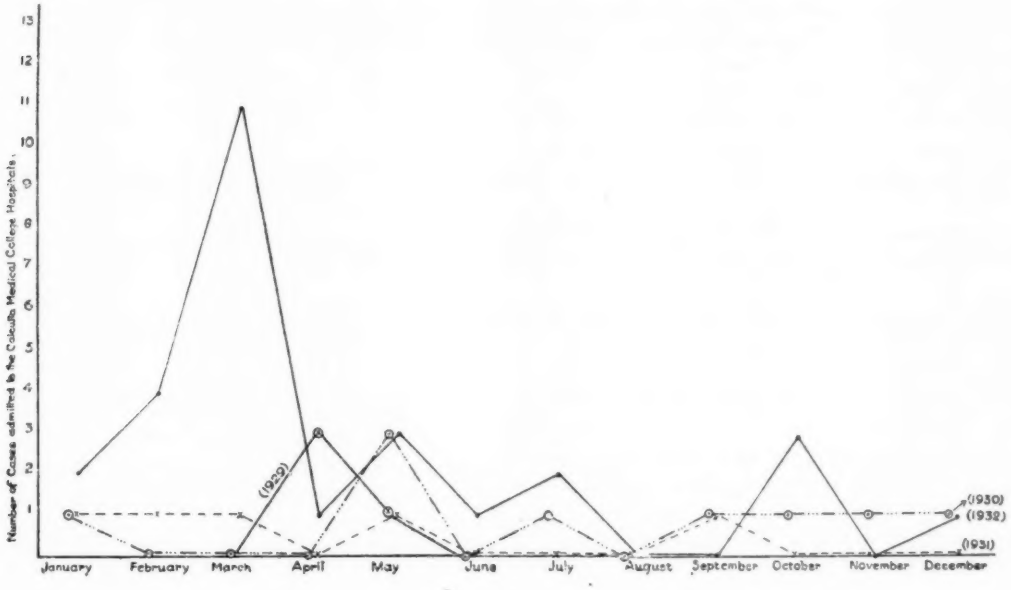
B. Sen, however concluded from his study on the the epidemic strains isolated in Calcutta, during the period of March and April, 1932, "that the then Calcutta epidemic of meningitis was due to Type IV mainly and partly Type II", as all the eleven strains isolated from twenty samples of cerebrospinal fluid, when "tested with high-titred typed serum, according to the agglutination method, prescribed by the National Institute of Health, Washington, D.C., ** nine of them were found to correspond with type IV, and two with type II" (Gordon-Murray).

Gordon and Murray (1915), by the systematic application of the 'absorption of agglutinin' reaction by a standardized technique, definitely demonstrated that all the strains of meningococci isolated from military cases during the 1915 epidemic might be sharply divided, into four distinct types I, II, III and IV, according to their frequency, "By simple agglutination these four

types fell into two main groups, showing a relationship to one another similar to the two groups described by GRIFFITH and by SCOTT ; one comprised Type I & III and the other Types II & IV."

MURRAY (1929) gave a historical review on the classification of meningococci by agglutination tests, in his monograph on "The Meningococcus", and therein he set out in a tabular form the relation of the various types described by different workers which can be correlated exactly. (vide. Table I).

All workers accept the presence of a definite relationship, by the cross agglutinations, between the four Gordon and Murray Types of Meningococcus. Types I & IV are unrelated ; Types I & III, and also II & IV are closely related. Types I & II, and also III and IV are related to some degree. It must be noted, however, that every strain does not exhibit this close relationship. (Fig.—1).



"Since the Pasteur Institute serums and cultures are readily available and since Gordon and Murray's types have been much used and cultures of them are widely distributed, MURRAY, with the idea that a uniform international classification would greatly help in the working with the meningococci, suggested a tentative subdivision of meningococci nito four main Groups : A, B, C, and D, with the, at present known, types AI, AIII, BII and BIV, whereas the *Second Standardisation Conference, Health Organisation, League of Nations* (*Paris*, 1922), proposed that a primary division was to be made into groups designated by Roman numeral (according to the new accepted subdivision into groups I and II), and a subdivision into subgroups designated by small Latin letters. The primary divisions into groups was to be based upon agglutination approaching the limitation titre, in a high dilution of monovalent serum which are relatively free from heterologous agglutination. The secondary division into types might be based upon agglutination and the absorption tests. Strains which can not be accurately identified were to be classed under a group "X".

In order to tackle this important problem of the antigenic multiplicity of the types found in various countries, an international nomenclature of groups and a standardised technique of typing should be formulated at once, in our opinion, by the Health Organisation, League of Nations, and should be worked upon by the workers all over the world.

As regards the difference in the types of the 'epidemic strains' of Calcutta, in 'March-April, 1932' and in August-November, 1933, a critical examination of the epidemiological graphs, charted

from statistics kindly supplied by U. P. Basu, Physician to the Calcutta Medical College Hospitals, and A. N. Sen, Physician-in-charge, Infectious Ward, Campbell Medical Hospital, will show that all thes trains isolated by B. Sen, were from cases occurring at the height of the epidemic of 1932, and our strains were collected at a period when the epidemic of 1933 had subsided. GRIFFITH (1917), as referred to by TOPLEY and WILSON (1931), is a combined study of spinal and nasopharyngeal strains came to one very important conclusion. He found that his spinal strains fell fairly readily into two groups; his pharyngeal strains, however, were unevenly distributed, 3 falling in Group I (Types I & III, GORDON-MURRAY), and 50 in Group II (Types II & IV, GORDON-MURRAY). The strains of group II had a simpler antigenic structure than those of group I; this led him to suggest that the strains of simple antigenic structure are less virulent than the strains of complex antigenic structure, which occur most frequently at the height of an epidemic. "In conclusion," here also we are quoting Topley and Wilson (1931), "we cannot do better than refer to the review furnished by ANDREWS (1917) on the serological classification of the meningococcus. He concludes that the meningococcus is a single, definite species, recognizable by its cultural and fermentation reactions, and widely spread as a pharyngeal parasite. In this stage it presents two antigenic components, which are rarely equally balanced, so that there emerge two primary races—Group I and Group II. Even in non-epidemic times, certain strains of these simple cocci possess sufficient virulence to attack the very young; hence we have sporadic cerebrospinal fever always with us. There is a tendency at times for certain strains to increase in virulence, and this is accompanied by an increased complexity in the antigenic structure, taking different forms in different strains; we donot know whether the increased virulence is due to the increased complexity. The phenomenon is seen particularly in Group I, so that whereas among the less virulent forms Group II is the commoner, in the more highly virulent ones, the proportions of the groups become more equal. When cerebrospinal fever attains epidemic prevalence, the virulent strains concerned stand out with relative but not absolute distinctness. The strains in question are possibly different in different epidemics." BRANHAM (1932) reported regarding the various types in the 'epidemic strains' of the different epidemics in the United States.

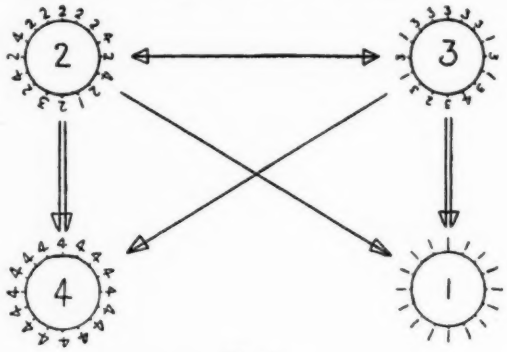


Fig. 1.
Relationship between the type Meningococci according to Field & Baker."
Ref.—"*A system of Becteriology Vol.* 2. "*Page* 310."

"During 1915-1918 group II was as common in many outbreaks as I, and sometimes even more common. During 1927-1930 group II has taken last place, and only 5.5% of the recent studied strains have fallen into it. While during the 1915-1918 period the groups were represented in the following order: I, II, III, and IV; during 1927-1930, the order was as follows: I, III, IV, N. flavescens and II. In the recent epidemics more than 80% of the strains studied fell into groups I and II as compared with 50 to 60 % in earlier years."

Systematic and intensive study of the serological types of the meningococci prevalent in the different epidemics and also in the different periods of the same epidemic, in India, is absolutely essential for the choice of strains to be used in preparing therapeutic sera and in selecting standard 'type' strains.

TABLE 1

Dopter (Strain in Brackets).	Gordon and Murray.	Pullen.	American (Rockfeller).	F. Griffith (A. S. Griffith)	Nicolle Debains and Jonan.
Meningococcus (M.T.)	I	C	Parameningococcus	IA	A
	III	A	Irregular Meningococcus	IB	
Parameningococcus *L* (P. S. and P. W.)	II	B	Normal Meaingococcus	II	B
Parameningococcus *B* (P.L.)	IV	—	Irregular Meningococcus	II	
Parameningococcus *B* (P.M.)	—	—	—	—	C (Rare)
Parameningococcus *V* (P. 25)	—	—	—	—	D (Very rare)

Relationship to one another of the agglutinable types of Meningococcus described by different authors who included known strains in their series.

Ref.—A system of Bacteriology—Vol. 2. Page 312.

MENINGOCOCCUS.

MACROSCOPIC AGGLULINATION TESTS.

Provisional Grouping.

Date.	Strain No.	Type I	Type II	Type III	Type IV	N. H. Ser. Cont.	N. S. alive Control.	Remark.
17-11-33.								
1	Ext IN	— — —	— — —	+ + +	— — —	— — —	— — —	
2	Ext I	— — —	— — —	+ + +	— — —	— — —	— — —	
3	Bed 2	— — —	— — —	+ + +	— — —			
4	3N2	— — —	— — —	+ + +	— — —	— — —	— — —	
5	B3	+ + +	— — —	+ — —	— — —	— — —	— —	Faint agglutination with Type III
6	3N3	+ + +	— —	— —	— —	— —	— —	
7	B4	+ + +	— —	— —	— —	— —	— —	— —
8	B6	+ + +	— —	— —	— —	— —	— —	
9	7N2	— — —	— — —	+ + +	— — —	— — —	— — —	
22-11-33								
10	14N	— — —	— — —	+ + +	— —	— —	— —	
11	9N	+ + +	— —	— —	— —	— —	— —	
12	58N2	+ + +	— —	— —	— —	— —	— —	
13	57N	+ + +	— — —	— — —	— — —	— — —	— —	
14	59N	— — —	— — —	+ + +	— — —	— — —	— — —	
15	58N3	+ + +	— — —	— — —	— — —	— — —	— — —	
16	B12	+ + +	— — —	— — —	— — —	— — —	— — —	
27-11-33.								
17	6N	+ + +	— — —	— — —	— — —	— — —	— — —	
18	B7	— — —	— — —	+ + +	— — —	— — —	— — —	
19	7N	— — —	— —	+ + +	— — —	— — —	— — —	
20	B8	— — —	— — —	+ + +	— — —	— — —	— — —	
21	8N	+ + +	— —	— —	— —	— —	— —	
22	8N2	+ — —	— — —	— — —	— — —	— — —	— — —	*Faint agglulination.
23	9N2	— — —	— — —	+ + +	— — —	— — —	— — —	
24	11N	— — —	— — —	+ + +	— — —	— — —	— — —	
25	14N4	— — —	— — —	+ + +	— — —	— — —	— — —	
26	14N5	+ + +	— — —	— — —	— — —	— — —	— — —	

PROTOCOL I.

Total number of Cerebrospinal fluids	Total number of cases	Number of cases clinically diagnosed as C. S. meningitis	Number of cases diagnosed otherwise.	Number of C. S. Fluids from which MENINGOCOCCUS has been isolated	Number of C. S. Fluids showing no growth	Number of C. S. fluids showing Contaminated growth.	Number of Strains strains obtained from isolated meningococcus	Number of C. S. fluids from which organisms other than Meningococcus isolated.	AGE INCIDENCE. number of cases.					
									5-10 yrs.	10-20 yrs.	20-30 yrs.	30-40 yrs.	40 up yrs.	Age not known
75	57	53	4	51	15	9	42	3 (i) (ii) (iii)	2	23	14	3	2	7

Total number of Cerebrospinal fluids obtained from clinically diagnosed Cerebrospinal Meningitis cases 70
Total number of Cerebrospinal fluids obtained from cases diagnosed otherwise 5

75(samples)

PROTOCOL II.

Agglutination Test. (Macroscopic and Microscopic).

Date.	Strain No.	Type Sera (Oxford Standards Lab). I	II	III	IV	Control.	Provisional Type.	Remarks.
15-8-33	.. Private	+ + +	— — —	+ — —	— — —	— — —	I	
28-833	.. C.H.3	— — —	— — —	+ + —	+ — —	— — —	III	
Do.	.. C.H.6	+ + —	— — —	— — —	— — —	— — —	I	
Do.	.. C.H.12	+ + —	— — —	— — —	— — —	— — —	I	
29-8-33	.. C.H.14	— — —	— — —	+ + —	— — —	— — —	III	
30-8-33	.. C.H.10	+ — —	— — —	+ + —	— — —	— — —	III	
Do.	.. C.H.5	+ + —	— — —	+ — —	— — —	— — —	I	
31-8-33	.. C.H.14N	+ + —	— — —	+ — —	— — —	— — —	I	
1-9-33	.. C.H.2	— — —	— — —	+ + —	— — —	— — —	III	
Do.	.. C.H.4	+ + —	— — —	— — —	— — —	— — —	I	
6-9-33	.. C.H.8	— — —	— — —	+ + —	— — —	— — —	III	
8-9-33	.. C.H.Ext.1	— — —	— — —	+ + —	— — —	— — —	III	
9-9-33	.. C.H.57N	+ + +	— — —	+ — —	— — —	— — —	I	
10-9-33	.. C.H.7	— — —	— — —	+ + —	— — —	— — —	III	
Do.	.. C.H.14N4	+ — —	— — —	+ + —	— — —	— — —	III	
11-9-33	.. C.H.3N	+ + —	— — —	+ — —	— — —	— — —	I	
Do.	.. C.H.59N	+ — —	— — —	+ + —	— — —	— — —	III	
14-9-33	.. C.H.3N2	— — —	— — —	+ + —	— — —	— — —	III	
18-9-33	.. C.H.3N3	+ + —	— — —	+ — —	— — —	— — —	I	
Do.	.. C.H.8N	+ + +	— — —	— — —	— — —	— — —	I	
Do.	.. C.H.14N5	+ + +	+ — —	+ — —	— — —	— — —	1	
Do.	.. C.H.58N2	— — —	— — —	+ + —	+ — —	— — —	III	
20-9-33	.. C.H.7N	+ — —	— — —	+ + —	— — —	— — —	III	
23-9-33	.. C.H.8N2	+ + +	— — —	+ — —	— — —	— — —	I	
Do.	.. C.H.14N6	+ — —	— — —	+ + +	— — —	— — —	III	
28-9-33	.. C.H.13	— — —	— — —	— — —	— — —	— — —	Nil	
Do.	.. C.H.56N	— — —	— — —	— — —	— — —	— — —	Nil	
30-9-33	.. C.H.59N2	— — —	— — —	+ — —	— — —	— — —	III	
2-10-33	.. C.H.7N2	— — —	+ — —	+ + —	— — —	— — —	III	
3-10-33	.. C.H.58N3	+ + —	— — —	— — —	— — —	— — —	I	
8-10-33	.. C.H.6N	+ + +	— — —	+ — —	— — —	— — —	I	
8-10-33	.. C.H.9N	+ + —	— — —	— — —	— — —	— — —	I	
10-10-33	.. C.H.11N2	+ + —	— — —	+ — —	— — —	— — —	I	
14-10-33	.. C.H.9N2	+ + —	— — —	— — —	— — —	— — —	I	
20-10-33	.. C.H.Ext. 1N	+ — —	— — —	+ + —	— — —	— — —	III	
17-11-33	.. C.H.10N	+ — —	— — —	+ + —	— — —	— — —	III	
Do.	.. C.H.59N4	+ + —	— — —	+ — —	— — —	— — —	I	

PROTOCOL III.

Agglutination test (microscopic).

Date.	Strain No.	Specific Agglutinating Sera (N. Y. Research Lab.) I			II			III			Control			Provisional type	Remarks.
	Private	+	+	+	—	—	—	+	—	—	—	—	—	I	
	C.H.3	+	—	—	—	—	—	+	+	+	—	—	—	III	
	C.H.6	+	+	—	—	—	—	—	—	—	—	—	—	I	
	C.H.12	+	+	—	—	—	—	+	—	—	—	—	—	I	
	C.H.14	+	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.14N	+	+	—	—	—	—	+	—	—	—	—	—	I	
	C.H.2	+	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.4	+	+	—	—	—	—	—	—	—	—	—	—	I	
	C.H.8	—	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.Ext1	+	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.57N	+	+	+	—	—	—	+	—	—	—	—	—	I	
	C.H.7	—	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.14N4	+	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.3N	+	+	—	—	—	—	+	—	—	—	—	—	I	
	C.H.59N	+	—	—	—	—	—	+	+	+	—	—	—	III	
	C.H.3N2	—	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.3N3	+	+	+	—	—	—	+	—	—	—	—	—	I	
	C.H.8N	+	+	+	—	—	—	+	—	—	—	—	—	I	
	C.H.14N5	+	+	+	+	—	—	+	—	—	—	—	—	I	
	C.H.58N2	—	—	—	+	—	—	+	+	+	—	—	—	III	
	C.H.7N	+	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.8N2	+	+	+	—	—	—	+	—	—	—	—	—	I	
	C.H.14N6	+	—	—	—	—	—	+	+	+	—	—	—	III	
	C.H.13	—	—	—	—	—	—	—	—	—	—	—	—	Nil	
	C.H.56N	—	—	—	—	—	—	—	—	—	—	—	—	Nil	
	C.H.59N2	—	—	—	—	—	—	+	—	—	—	—	—	III	
	C.H.7N2	—	—	—	+	—	—	+	+	+	—	—	—	III	
	C.H.58N3	+	+	—	—	—	—	—	—	—	—	—	—	I	
	C.H.6N	+	+	+	—	—	—	+	—	—	—	—	—	I	
	C.H.9N	+	+	+	—	—	—	+	—	—	—	—	—	I	
	C.H.11N2	+	+	—	—	—	—	+	—	—	—	—	—	I	
	C.H.9N2	+	+	—	—	—	—	—	—	—	—	—	—	I	
	C.H.Ext.1N	+	—	—	—	—	—	+	+	+	—	—	—	III	
	C.H.10N	+	—	—	—	—	—	+	+	—	—	—	—	III	
	C.H.59N4	+	+	—	—	—	—	+	—	—	—	—	—	I	

X-Ray in the Treatment of Tuberculous Adenitis

B. V. JOSHI, M. B. B. S.,

(From the Dhanarajgiri Hospital, Sholapur).

Introduction

The advances in radiotherapy during the last twenty years have placed in our hands a very useful therapeutic agent in the treatment of tuberculous adenitis. Before the advent of radiotherapy the therapeutic measures employed were firstly those calculated to improve the vitality of the patient such as hygienic measures and antitubercular medication in the very early stages and secondly surgical removal in suitable cases. The necessity was long felt of a powerful agent to kill the tubercle bacilli at a stage before they had broken up and proceeded beyond the first line of defence in the body namely the lymphatic glands, instead of relying on the improvement in general body resistance alone to cope with such a powerful resistant and dangerous enemy. Surgical removal too often proves insufficient due to postoperative recurrence and is often seriously handicapped by periadenitis causing adhesions with important structures and making removal difficult and dangerous. The lowering of the patients' resistance after an operation for extensive removal is also an important point to be considered in the majority of cases especially because the vitality of the patient is the most potent factor in preventing the progress of the disease. Radiotherapy answers a longfelt need in both these respects, because it encapsules and destroys the virus in its very first stage and prevents its further spread by causing fibrosis of the surrounding lymphatics without lowering the patients' resistance, obviates the necessity of surgical interference in all cases except where caseation has already advanced, and serves as a very efficient postoperative measure against recurrence where for some reason or other surgical removal becomes absolutely necessary. On account of these advantages radiotherapy has now been rightly recognised as the treatment of choice in dealing with non-caseating tuberculous adenitis and has replaced surgery to a large extent in this field in most of the more advanced countries.

I propose to state briefly in this paper my experience gathered from about 50 cases subjected to radiotherapy in the *Dhanarajgiri Hospital Sholapur* during the last three years. But before proceeding further it is advisable to state in brief the etiology and the pathology of tuberculous adenitis and also to explain the therapeutic action of X-rays and radium in this affection. The disease occurs most commonly in children and young adults. Heredity, unhealthy surroundings, insufficient or bad food, lack of fresh air, debilitating illnesses and other factors lower the resistance of the patient and the soil, so to say, is prepared by chronic inflammatory changes in the glands due to some focus of irritation such as pediculosis capitis, decayed teeth, chronic otorrhoea, enlarged tonsils and adenoids or eczema of the face. The bacilli introduced through infected milk, inhalation or direct contact with tuberculous patients or from some pre-existing focus such as tracheobronchial glands, get into the lymphatic circulation through denuded or even healthy mucous membranes and are first arrested in the lymphatic glands where they set up inflammation causing hyperplasia and periadenitis, giving rise to the so-called fleshy enlargement of the glands. The affected gland appears pinkish in colour and presents microscopically a great increase in lymphoid corpuscles, some thickening of the fibrous capsule and trabeculae, the characteristic nodules with the typical giant-cell systems. When the bacilli and their toxins begin to gain ascendancy over the resistance of the gland, foci of caseation begin to appear. These foci gradually enlarge and coalesce and due to the lowered resistance which very often leads to a secondary infection by low-grade pyogenic organisms, they suppurate and ultimately form loculated abscesses with sinuses. Unhealthy granulations are often seen protruding through the sinuses and the neighbouring skin is almost invariably affected making healing extremely difficult. Often an abscess which apparently appears to be very superficial is found to have a very deep subfascial origin. The periadenitis with matting of the glands and adhesions with important neighbouring structures make surgical removal very difficult and dangerous. Dissemin-

ation through the lymphatics has nearly always occurred by the time this stage is reached.

While considering the action of X-rays and radium in the treatment of tuberculous adenitis, it is necessary to describe in brief the biological effects of the radiation employed. The main biological effects on irradiated tissues are (1) a temporary hyperaemia followed by (2) endarteritis causing blockage of capillaries and diminution of the blood-supply of the part (3) blockage of lymphatics due to fibrosis and (4) degeneration of the specialised and parenchymatous cells into fibrous tissue. X-rays have a peculiar selective action on the specialised, rapidly dividing, and embryonic type of cells, such as malignant cells, endothelial lining of arterioles, lymphatic tissue, glandular parenchymatous tissue and also collagenous hyperplasia such as is present in hypertrophied scars and keloids.

The changes observed in the irradiated area after an exposure are a temporary redness of the skin 8 days after the exposure if the dose amounts to a Unit Skin dose, and sometimes a slight temporary enlargement of the glands. On the 10th to 15th day the glands appear matted but harder to the feel. A definite reduction in the size of the glands can be made out on palpation, a fortnight or three weeks after an adequate exposure. A total of four to five exposures is found to reduce the size of the glands at least to half or one third and the reduction in size continues for some months even after the treatment has been stopped. It has not been possible for me to examine the sections of glands at different stages of irradiation but I would rather describe the operative findings in a case which was operated upon 8 months after a single dose of 200 R-units of rays generated at 150 K. V. and filtered through 3 mm. aluminium. Though the dose was very small we found that the superficial glands were considerably reduced in size, pale and very firm in consistence. Caseation was detected only in one or two glands in the deepest layers. But the main feature was marked fibrosis and adhesions in the irradiated region making removal of the glands very difficult. The naked eye characters are sufficient to corroborate the pathological changes described above and fully endorse the claims of radiotherapy regarding destruction of the virus by starvation and encapsulation through diminution of blood-supply and induction of fibrosis in the affected gland, and not by any direct lethal action on the tubercle bacilli. The surrounding fibrosis is even more extensive in the case of X-ray than radium, though the latter is accredited to have the advantage of a slightly deeper action.

The most common theory which is generally recognised to explain the action of X-rays and radium in the best way is briefly as follows. The chromosomes of the more highly specialised cells, specially those which are just about to divide are markedly sensitive to radiations of short wave length and the absorption of the radiant energy by these chromosomes results in an unknown way in the formation of a peculiar cellular toxin which in smaller quantities or earlier stages acts like any other irritant and produces hyperaemia in the irradiated region. The time taken for the completion of these cellular changes and the action of the cellular toxin generated, is responsible for the so-called latent period which intervenes between the date of irradiation and the appearance of first visible sign of the hyperaemia or reaction, seen in the form of local erythema or slight swelling of the gland due to increased vascularity and also as malaise, headache or slight rise of temperature depending on the severity of the dose and tolerance of the patient. This latent paeriod is usually about 8 days but may vary from 4 to 15 days according to the severity and frequency of the dosage. When the dose is sufficiently large the toxin continues to act after this latent period on the specialised parenchymatous cells and the endothelial lining of capillaries and lymphatics causing them to degenerate into fibrous tissue which contracts and shrinks. When the dose is even more severe the same toxin brings about local necrosis and if the doses are too often repeated for a long period its absorption into the general system is likely to result in blood changes heralded by leucopenia and followed by severe anaemia and damage to adrenals, kidneys, liver and spleen. In the treatment of tuberculous adenitis the chief aim is to utilise the fibrosing action of the toxin, to encapsule the virus and to bring about a blockage of the lymphatics in the local area, and dosage must be timed and adjusted to bring about the requisite changes without damaging the overlying skin.

Technique

The latest researches in the study of the bio-

logical properties of the different qualities and quantities of X-ray and radium radiations, and the improvements in the methods and means of measuring and generating the required quality of X-radiation, have introduced accuracy and precision in the dosage of radiotherapy making it possible to bring about the requisite results without fear of overdosage. For the treatment of tuberculous adenitis textbooks recommend the employment of X-radiation generated at 120 to 150 K. V. and filtered through 3 mm. aluminium. The dose recommended is 40 per cent of the Unit Skin Dose which latter is the minimum quantity of radiation which when administered in one sitting on the inner aspect of the thigh is sufficient to produce erythema of the 1st degree which disappears within two to three days without leaving any pigmentation on the 8th day after the exposure. This dose is usually found to be 590 R-units but may vary from 550 to 680 R-units when smaller doses are given at short intervals according to the sensitiveness of the patient. Individual sensitiveness, fairness of complexion, shortness of the interval between consecutive sittings, vascularity of the part irradiated, and the preponderance of glandular or lymphatic tissue in the irradiated region, local application of irritants or caustics, medication with arsenic, iron, gold, quinine, haematoxylin, iodine etc, and heliotherapy and diathermy are all factors which are likely to enhance the severity of the reaction. Such sensitising factor must be fully taken into consideration and if possible should be avoided in radiotherapy. Taking 600 R-units as the practical Unit Skin Dose, 40 per cent of it comes to about 240 R-units. For efficient treatment of tuberculous adenitis theoretical considerations require that the deepest portions of the lesion must receive at least 250 to 300 R-units. It is needless to say that this becomes a difficult task because the spuerficial layers of the body absorb a good deal of the radiation so that the depth-dose is found to be only a fraction of the total quantity administered to the skin-surface. The factors to be taken into consideration for the calculation of the depth-dose are the hardness of the radiation, the filters employed, the skin-focus distance, the spreading, scattering and absorption of the radiation in the superimposed layers of tissues depending upon their relative sensitivity. I need not bother you with the details of the complicated calculation of the practical effective depth dose but I have only enumerated these various factors to show you how difficult is the task of the radiologist to adjust the dosage so that the deepest portions of the lesion receive at least 300 R-units without injury to the overlying skin and the superficial tissues.

The practical plan of treatment generally recommended in text-books is to administer 25 per cent of the Erythema dose at each sitting, repeating four or five such doses at weekly or biweekly intervals and then to wait for about six weeks before a next course of four more weekly doses is administered. This is a fairly good procedure in early straightforward cases, but in the majority of hospital cases the lesion is too far advanced for this course, and practical and economical considerations make it imperative to reduce the total number of sittings and the the total period of full treatment as far as possible. Hence it becomes necessary to administer the biggest possible dose without transgressing the safe limit. I have found that when the lesion is not too extensive, about 3 to 4 doses of 300 R-units at fortnightly intervals on each field suffice to produce complete fibrosis of the affected glands without fear of recurrence. When the superficial glands have fibrosed, I usually employ hard radiation generated at 185 K. V. and filtered through 0.5 mm. copper filter in the last two or three doses in order that sufficient dose should reach the deepest parts of the lesion.

Regional Technique

Neck :—The usual regions affected are the posterior, submaxillary, supraclavicular and the submental triangles, but I have also met with lesions in the pre-auricular and the sub-occipital glands. The usual dosage is 4 to 5 fortnightly doses of 1300 R-units each at 150 K. V. 3 mm. Al. filter and 40 cms. Skin focus distance with a field of 6×8 cms. Though the lesion may be present in one region only it is advisable to give one or two doses to the other two triangles also as a prohylactic measure to guard against any latent lesions. It is essential that the thyroid, the oesophagus and the larynx which are particularly vulnerable should be carefully protected, the direction of the rays if possible being turned away from the centre of the neck. When the skin of the parotid region is included in the irradiated region it usually gets inflamed on the very day of the exposure but the inflammation subsides

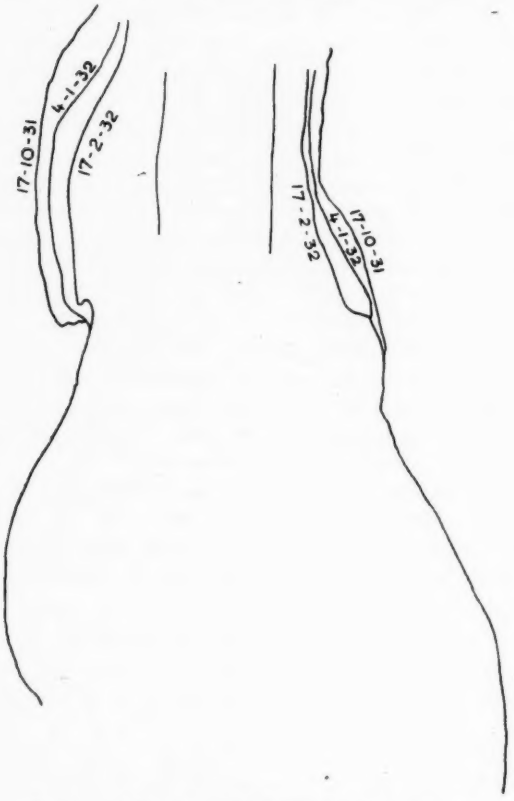
without any permanent damage within a day or two. This reaction cannot be avoided when the pre-auricular gland is affected. No salivary disturbances have been noticed even after the repeated irradiation of the parotid, submaxillary or submental regions. Before passing on to the next region I would like to draw the attention of the radiologist to the glands just below the angle of the jaw which are invariably found to be affected on the operation table though their enlargement may not be felt from outside.

Axilla :—The technique is almost the same. The lesion being superficial two to three doses are usually sufficient. It is important to remember that intractable brachial neuralgia may occur if the doses administered in this region are too severe or too frequent.

Mesenteric glands :—I have obtained very encouraging results in this affection with radiotherapy. The risk being too great, operation is seldom undertaken unless chronic obstruction is present, and the lesion being too extensive and generally associated with tubercular peritonitis, the application of radium becomes rather difficult and tedious. Hence X-ray therapy may be considered to promise the best results in this affection. The most common site is of course the right iliac fossa but glands are also found higher up and on the left side. Cross-fire radiation from front and back. and if possible from the side with hard radiation (185 K. V., 0.5 mm. Cu. filter) can be employed with advantage and four to five exposures of 300 R-units each on each field at fortnightly intervals are found to give marked relief, Care must be taken to protect the liver, spleen, suprarenal bodies and kidneys and ovaries in choosing the fields. Vomiting occurs on the day of the exposure in some patients but may be allayed by a preliminary dose of liq. morphine hydrochlor. m.20 and treatment should be given preferably in the afternoon about 3 to 4 hours after a full meal. Pain is remarkably relieved and marked reduction is found in the size of the lump. Localised adhesive peritonitis is also benefited. Complete cure may be obtained in very early cases when the lesion is limited to glands alone but when the intestines are affected recurrence cannot be prevented and if the intestinal lesions are advanced little relief can be obtained from radiotherapy alone as the intestinal dose of radiotherapy is too large to be administered safely. I should like to quote a very interesting case we came across in dealing with this region. The patient aged about 30 came with symptoms suggestive of gastric ulcer and a distinct lump in the left hypochondriac region. A laparotomy was done and it was discovered that there was a lump of matted and adherent tubercular glands with extensive adhesions forming a ring like constriction around the body of the stomach. Injections of oxygen into the peritoneum were found to give some relief. I gave 3 exposures of 300 R-units each with hard radiation at fortnightly intervals and found that the lump was reduced to a certain extent and pain was relieved by about 62%. The patient was operated upon a second time and the surgeon reported the glandular mass to have been reduced to at least half its original size. Extensive fibrosis with adhesions was also discovered and some further relief was obtained on breaking up the adhesions. The patient finding the pain quite tolerable did not report for further treatment. This case is quite sufficient to prove the utility of X-rays in the treatment if mesenteric glands.

Mediastinal glands :—The diagnosis of tuberculous affection of these glands cannot be made without a proper X-ray examination in the antero-posterior and oblique positions. I need not describe to clinicians how the affection of these glands is often discovered to be at the root of apparently unaccountable debility or daily rise of temperature and how the pressure of some of these glands on the bronchi gives rise to apparent signs of consolidation in the apical regions. The treatment of these glands is almost always a great problem but the results obtained by radiotherapy in one of my cases justify further trials in this affection. Radiations generated at 90 K. V. and filtered through 1 mm. Al. filter were used, the patient being screened in the oblique position for 5 to 7 minutes on the screening stand. Four such exposures were given at weekly intervals and the last two exposures were given on the central region from the front employing rays generated at 150 K. V. and filtered through 3 mm. Al. filter, 300 R-units being given at each sitting. There was marked relief of symptoms and the superimposed tracings from teleroentgenograms taken on different dates and appended herewith show definite reduction in the size of the enlarged gland (*See diagram*).

Ilio-inguinal glands :—The technique is the same as in the case of cervical and axillary adenitis.



Superimposed Teleradiograms to show the effects of treatment.

The following is a brief statement of the account of the 50 cases treated.

Neck—32.

Axilla—3.

Mesenteric glands—10 ; cured 3 ; improved 6 ; recurrence 1.

Glands of Mediastinum —1.

Caseated glands 9 ; cured 1

Operated—19.

Total cured—15.

Improved—23.

Recurrence—3 in nonirradiated region

Reactions :

Temporary pigmentation—7.

Swelling of skin of parotid region—4

Burning sensation—1.

Vomiting—3.

Referring to the claims of radiotherapy regarding cure I can confidently assert that in early cases where the lesion has not extended beyond the glands and caseation is not present complete cure with minimum chances of recurrence can be guaranteed. But caseation is a definite contraindication to the immediate adoption of radiotherapy because it tends to increase caseation and suppuration by lowering the resistance of the irradiated glandular tissue. In most of my cases where discharging sinuses or large caseating masses were present the results of radiotherapy were not so satisfactory though the neighbouring glands were completely fibrosed thus preventing further spread and the discharge fron sinuses was found to be less. The best course in such cases is of course aspiration at suitable intervals, heliotherapy and sanatorium treatment combined with local and general medication are helpful. Surgical removal of the affected mass is also useful in cases where it can be safely undertaken. When affection of the lungs, pleurase or intestines is simultaneously present, treatment of the latter in a sanatorium is the best course to be adopted. In the non-caseating adenitis with adhesions radiotherapy completely holds the field because surgical intervention is contraindicated, but even in earlier stages when adhesions are not present, radiotherapy is in my opinion superior to surgical removal because (1) it does not leave an unsightly scar (2) it does not lower the resistance of the patient and (3) it effectively prevents further spread by producing fibrosis of the lymphatics whereas the open mouths of cut lymphatics after a surgical removal are very likely to serve as channels for the further spread of infection and recurrence. In all cases radiotherapy serves as a very useful post-operative preventive measure after surgical removal of the affected glands. In the poorer class of hospital patients it becomes often necessary from the practical point of view to curtail the period of treatment as far as possible because they are too poor to stay for the required period in a city where alone such specialised treatments is possible or to afford the recurrent expenses of 3 or 4 fortnightly visits to the hospital from their village. Very often they go away with one or two exposures only and do not return for further treatment, thus frustrating the aims of the whole procedure. In such cases the best course appears to be surgical removal followed by one or two large doses of x-radiation to prevent recurrence. Radiotherapy should not be started in any case where surgical intervention is likely to be neces-

sary until the operation is over because of the fibrosis which seriously handicaps the surgeon.

Conclusion.

Medicine, surgery, and radiotherapy are all allied branches of the same science, and they may rightly be expected to aid each other in a combined effort in the relief of suffering humanity. But enthusiasts in each line try to advocate their own favourite method in each and every case and try to run down other methods condemning them wholesale to prove the superiority of what they advocate. Thus we hear of surgeons condemning X-rays as an uncertain therapeutic measure and a double-edged weapon which by producing fibrosis makes surgical intervention difficult and dangerous, whereas we hear of radiotherapists who would oust the surgeon entirely from the field in the treatment of tuberculous adenitis by pointing to the danger of dissemination through the cut lymphatics and of lowering of the patients' vitality. But I honestly hate such a tendency in any one, particularly because we live in an age of rationalism and each branch of the great medical science is sufficiently advanced to be based on a perfectly rational scientific basis, so that no room is left for any empiricism at all. The pathological changes in a particular case can be fairly accurately judged with the knowledge we possess and the possibilities, the advantages and dangers of each line of treatment can be fairly well estimated, so that there should be very little difficulty in finding out what is best in any particular case if the mind is kept free from all prejudices. Every case has its own individual peculiarities and must be independently judged from medical as well as economical and practical points of view before any course of treatment can be decided upon. A conservative trend of mind with deep rooted prejudices has proved to be the greatest of the enemies of pregress in the history of science and hence all should keep an open mind in combining all their resources for brining out the very best of what they possess for the relief of suffering humanity and thus making smooth the path for further scientific research.

Acknowledgement.

The encouragement, help, advice and guidance of Dr. B. V. Mulay are mainly responsible for what little I have been able to do in radiotherapy, and I take this opportunity to thank him for the same.

* Paper read at the Scientific Section of the All-India Medical Conference, held at Bombay, Dec. 1933.

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Editorial Comments

The need for Compulsory Health Insurance

At the Tenth All-India Medical Conference held at Bombay in December, 1933 the Central Council of Indian Medical Association in collaboration with the Standing Committee of the All-India Medical Licentiates' Association has been authorised "to draw up a scheme of national health insurance on the lines of similar schemes in other countries." We extend to the proposition our whole hearted support.

Society, constituted as it is today in India as elsewhere, knows of a large number of men, women and children in the rural centres as well as towns, who because of poverty are unable to take advantage of medical and surgical services or use the drugs that may be prescribed for them.

It is only the richer or relatively more favourably placed among the agriculturists, artisans, trading classes, clerks and middleclass *bhadraloks* who in the present state of things can enjoy the benefits of medical care. The uneven distribution of medical service among the members of the community is the most dismal fact of Indian social conditions in the towns no less than in the villages.

It will be easily understood that pharmacies and drug stores are not in a position to offer their goods to patients only for the asking. These establishments have at least to make their two ends meet.

Medical practitioners and surgeons, Kavirajes and Hakims, again, with the best of intentions and even when inspired by the highest idealism and enthusiasm for social service, find it impossible to attend cases always on an honorary basis. The economic problem stares them in the face as much as it does the members of other professions. The best that can be done by the proprietors of pharmacies and medical practitioners in an individual manner is to charge the minimum prices economically possible for the medicines and appliances as well as the most moderate concievable fees. But there is a limit to this "minimum" and "moderateness" from the standpoint of the stores and the practitioners. Should an extra dose of philanthropy happen to be in operation the stores are likely to go out of the market and the practitioners to be placed on the list of paupers. On the other hand, whatever the minimum price and fees the number of persons that fail to pay this minimum in India and are compelled to go without medicines and medical help when such are urgently required is appallingly large.

Even in regard to the country of millionaires, namely the U. S. A., the method of moderating the fees has been found to be too inadequate and incapable of solving the problems of payment for medical services. "A 10 or 20 per cent. reduction in the costs", remark Falk, Rorem and Ring in *The Costs of Medical Care* (1933), "is of no significance to the person who can not pay even 10 or 20 per cent of the amount charged".

We tough here really two different aspects of the great problem of poverty. In the first place, there is the important consideration of a relatively more equitable and universal or uniform distribution of medical service. This consists in bringing as many patients as possible to the doors of the doctors or the doctors to as many patients as possible.

Secondly, there is the problem of finding employment for the medical practitioner. It is now agreed on all hands that India must be furnished with more medical men, more qualified Kavirajes and Hakims, more surgeons, more dentists, more specialists in the different diseases. It is necessary, therefore, in the interests of the country, to make the healing art economically more worthwhile and attractive. It should be the lookout of the community to enable the medical practitioners of all denominations to carry on even if it be on a modest level. From the standpoint of the community the essential problem consists in rendering the medical service as cheap as possible. We encounter here the problem of organized welfare.

One method would consist in the establishment of clinic by educational institutions in the districts as well as in Calcutta, say, under the auspices of the University, colleges, Districts Boards and Municipalities, The patients may be required to pay a part of the fees, the rest being paid by the institutions. The practitioners' fees must of course be very modest by all means.

Secondly, free or semi-free health services may be offered by employers to their employees. The example already set by one or two business establishments ought to be followed up by others. Some of the Government offices have been doing pioneering work in this line. About thirty per cent of the coal mines in the Jharia section as well as a number of tea plantations belong likewise to this group of pioneers. The Maternity Benefit Acts of Bombay and the C. P. deserve also to be mentioned. This sort of voluntary philanthropic social service will have to be expanded all along the line.

In addition to organized welfare on a charitable or semi-charitable basis as suggested above we require some movements in the ordinary insurance field. The unions of working men ought themselves to organize sickness benefits out of their funds. A large part of the trade union activity should take the form of propaganda along the lines.

Besides, the business of life insurance companies may and ought to be expanded in this direction. Health policies for employees may be sold out by them to employers on the group basis. The attention of insurance men should be seriously directed to this branch of business.

Neither charity, partial or hundred per cent, nor voluntary insurance through trade unions or ordinary business houses has succeeded in solving the problem of the nation's health requirements in other countries. Every country has been compelled to pass laws enabling the state to supervise and control the health insurance organization even in those few cases where the insurance is voluntary and not yet compulsory.

The combined experience of mankind is today predominantly in favour of *state compulsory health insurance*. The details of many of these schemes have been discussed at length in the paper by Professor Benoy Kumar Sarkar on the "Technique and Finance of Health Insurance" published in the November 1933 number of this journal. It is not necessary to go into these items over again just at present.

One might naturally ask "Should not health insurance be left to the independent will and responsibility of the individual?" The answer is *No*. Individuals find it as impossible to pay the premium to an insurance company as to pay the doctor's fees or the druggists' bills. And among our agriculturists, artisans or middleclass men in India more than in other countries the surplus in the family budget is so limited that the ability or willingness to pay the premium or the bill is non-existent. Besides, the advantages of the "insurance principles" can hardly be appreciated by just those needy persons,—literate or illiterate,—for whom it is the most necessary. Indeed, if the combined experience of economically more lucky peoples, namely, those of Europe and America is of any value, it has been proven that voluntary health insurance cannot be depended upon either as an effective measure of health provision for the people or as a measure of administrative economy.

Sickness must not be treated as a private misfortune. It is not to be regarded as a calamity against which the individual should protect itself as much as it can. It is not even to be counted as a misfortune in which the family alone is interested and therefore which the family alone should attempt to combat or prevent. Rather, it is time to look upon sickness as a national misfortune. We should take it as a calamity for the entire community and therefore one to be prevented or cured by the community, i.e. the state.

Remarkable in its social and moral bearings are the advantages conferred on the community by compulsory sickness insurance legislation. On the one hand, the medical practitioner is relieved of the *burden of honorary service*. On the other hand, the patient is spared the ignominy of depending on the medical practitioner's benevolence or some philanthropic institution's charity.

The financial burden of sickness cannot be borne by the individual. It must be widely distributed throughout the country. Premium is therefore to be paid by three parties, first, the wage-

earner or salaried person, secondly, the employer, and thirdly, the state.

Since the premium is paid by a large number of persons, the higher-waged as well as the lower-waged, the healthy as well as the sick, the risk is well distributed and the rates per individual can become very small. Besides, the social good derived from such a system is extensive. As soon as the state and the community become financially responsible for the health insurance of the individual the prevention of disease is rendered almost on a *fait accompli*.

In every scheme of sanitation and public health compulsory health insurance on a wide basis should be regarded as a great prophylactic.

Current Medical Literature

MEDICINE.

Prevention and Treatment of Angina Pectoris.

W. EVANS and C. HOYLE (*Q. J. M.* Vol. III, No. 9, 105, Jan. 1934) have observed a series of 122 patients with angina pectoris (angina of effort) for over a period of three years with special reference to the comparative value of vasodilator drugs for the immediate treatment and prevention of attacks. Syphilis was present in 23 of their patients. Coronary thrombosis was only considered as a complication.

Each patient attended fortnightly. As a preliminary control of the therapeutic observations particular attention was paid to the duration of pain when rest was the only treatment. When an efficient standard for comparison had been obtained the following drugs were tried: glyceryl-trinitrate as tablets 1/100 to 1/25 gr., liquor trinitrini 10 minims (1/12 gr.) and capsules of a solution in oil 1/100 to 1/30 gr. and also the proprietary preparations—natirose dragees (Nativelle), nitrolingual capsules (Pohl), and trinitrine cafeinee pills (Dubois); amyl nitrite, 5 minims by inhalation : sodium nitrite, 3 to 5 gr., brandy, 1 oz., chloroform, 20 minims by inhalation ; carminatives and hypnotics. The patient's records were checked by personal observations during exercise over a measured itinerary.

The comparative results summarised show that glyceryl trinitrate in tablet form when absorbed from the mouth is by far the most effective agent for relieving attacks and for their immediate prevention. Eighty-six per cent. (105 in 122) patients obtained great relief and a further 11 per cent. (13 in 122) moderate relief. Other preparations of glyceryl trinitrate and other remedies tried did not give such good results. Glyceryl trinitrate tablets should deservedly hold the first place in routine treatment. This is the more advisable because they rarely cause objectionable symptoms, they are easy to store and carry, so that they are always available for immediate use and they are cheap. The only practical disadvantage is that they deteriorate in strength specially when exposed to air and heat so that they should, be used perferably within two months of manufacture. Amyl nitrite proved to be disappointing for the relief of attacks and it can only be recommended for those rare cases where glyceryl trinitrate fails to relieve. It has the further disadvantage of being useless for the prevention of attacks.

The use of glyceryl trinitrate tablets immediately before expected anginal attacks is a safe means of preventing pain and should be used far more widely in routine treatment than it is done at present. In the writers' service 84.5 per cent (61 in 72) patients obtained great benefit, and a further 12.5 per cent. (9 in 72) moderate benefit by using the drug in this way. This is a greater measure of improvement than was found from any of the remedies tried in their investigation of continuous treatment. Most patients preferred to take the drug at their own discretion, and this method of administration proved more effective than when it was taken at short fixed intervals, except for those patients who could not predict attacks with certainty. No harmful effects were met from such treatment, though patients used the drug freely for upwards of two or three years, and often this enabled them to take more physical exertion and lead a fuller life than had previously been possible.

J. C. B.

The Rhythm of Paroxysmal Tachycardia.

A. U. MACKINNON, (*Q. J. M.* Vol. III, No. 9, Jan., 1934) as a result of his electrocardiographic studies on paroxysmal tachycardia summarises his observations as follows :—

The common type of paroxysmal ventricular tachycardia is markedly regular, and such irregularities as are present between consecutive beats are so slight as to be inappreciable by the human ear as departures from a regular rhythm.

Certain cases of auricular paroxysmal tachycardia may be cliniacly irregular. In the absence of the so-called Gallavardin's sign—the presence of a venous wave in the neck beating at a definitely slower rate than the ventricle-clinical irregularity in a typical paroxymal tachycardia should not be held to indicate the presence of a ventricular

origin until the electrocardiogram has proved the diagnosis beyond dispute.

2. As a general rule cases of auricular paroxysmal tachycardia have a greater degree of regularity than those tachycardias arising in the ventricle.

3. Irregularity in paroxysmal ventricular tachycardia may be due to (1) conduction disturbances between focus and ventricle, (ii) focal stimuli being either too weak to excite the ventricle or ventricular excitability so diminished that the ventricle does not respond to normal stimuli; (iii) stimuli arising irregularly from a single focus; (iv) stimuli arising irregularly from more than one focus in the ventricle.

J. C. B.

The Blood picture in Pertussis.

H. E. THELANDER, H. G. HENDERSON and K. KILAGARIFF. (*J. Pediat.* 2 : 288, *March*, 1933). Ref. Amer. Jour. Dis. Child, Vol. 47 Jan. 1934) report of blood counts taken at frequent intervals during the course of active *pertussis* showing a constant and characterstic curve. For the first five to fifteen days there was no change in the lymphocytic count : then an abrupt rise began, and the number of lymphocytes rapidly increased for eight to twelve days. A return to normal followed within the next twenty days. The highest lymphocytic counts were found regularly at the time the most severe attacks of coughing occurred. The polymorphonuclears were also increased in number during pertussis, but not nearly so much as the lymphocytes. It is suggested that extraordinarily high lymphocytic counts are due to extension of the *pertussis bacilli* into the small bronchioles. where the absorption of toxin is increased. When measles arose during the stage of active pertussis, leukopenia was found. In a case of pertussis in which scarlet fever and empyema developed, the lymphocytic count was the same as that usually seen in pertussis, but the polymorphonuclear count rose and fell as secondary infections appeared and subsided.

J. C. B.

Whooping cough studied with the X-rays.

CARL HUNERMANN, (*Monatschr F. Kinderh.* 57 : 36 (Feb. 1933. Ref. Amer. Jour. Dis. Child ; Vol. 47, Jan, 1934) states that in the catarrahal stage of whooping cough roentgenologic examination does not show much beyond the fact that the pulmonary fields are unusually clear, the intercostal spaces seem wider, and the ribs horizontal than normal, and the diaphragm may be somewhat lower than usual. More typical change develops with the onset of the convulsive stage about a week after the beginning of the typical paroxysms. Broadening of the hilar region is first noted, followed by the development of striations rediating first into the lower paravertebral fields and later into the upper ones. The striations may be so marked that they completely blot out the shadow of the heart. The picture is that of a trinagle with its base on the diaphragm and its apex in the middle of the hilus. The author shows typical X-ray pictures. The triangle first described by Gott, occurs in the severe cases, although it is present in about 40, per cent of the lighter attacks. It occurs more frequently in attacks of longer duration. Infection of the nose and throat seems to favour the development of the picture. Probably the *pertussis virus* predisposes to other infections ; if coincidental nasopharyngitis is present, the combined perivascular, peribronchial and interstitial inflammations invariably produce the typical triangle. The triangle was seen before the clinical appearance of pneumonia in eighteen children in whom the disease later developed. The picture may be confused with the somewhat similar one which develop from bronchiolitis of influenza, tuberculosis or measles.

J. C. B.

Use of Dinitrophenol in Obesity and related Conditions.

M. L. TAINTER, A. B. STOCKTON and W. C. CUTTING, (*Jour. Amer. Med. Assoc.* November 4, 1933 Ref. Jour. Med. Vol. XIV, Jan. 1934) used alpha-dinitrophenol (1-2-4) in treating 113 consecutive cases of obesity. The treatment was not successful in twelve, in three because of inadequate loss of weight, probably due to insufficient dosage and in the other nine because of undesirable reactions to the drug. An average loss of weight of between 2 and 3 pounds weekly was produced by an average daily dose of 0.3 G. (5 grains) of the sodium dinitrophenol in capsules taken with meals.

The drug has been administered to individual patients continuously for as long as four months without demonstrable evidence of cumulative or toxic effects. The hypertension and albuminuria associted with obesity have been improved by dinitrophenol in a limited number of patients responding with reductions of body weight. The most important side action has been a skin rash, which occurred in 7 percent of the patients and which necessitated stoppage of treatment of 4.4 per cent of them. The next most important side action was a loss of taste for salt and sweet, observed in 5.3 per cent. of the patients. Both of these side actions cleared up quickly without sequelae. A suitable regimen of dinitrophenol medication for adults would appear to be an initial daily dose of 100 mg. of the sodium salt orally, taken with meals, with an increase at weekly intervals until a dose is established that causes a loss of body weight of between 2 and 3 pounds weekly or too marked or unpleasant symptoms of warmth and sweating.

J. C. B.

Psychology in Exophthalmic Goitre

E. Liek (*Deut. Zeitschr. Chir.* Ref. Med. World, Jan. 12 1934) stresses the importance of the mental condition in the aetiology of goitrous diseases. He has never known a case of exophthalmic goitre that was not able to give a history of some serious psychic injury, hence the importance he attaches to psycho-analysis throughout all stages of the treatment. Surgery, which Lick prefers to X-ray measures, should be only undertaken at a favourable mental stage and, for the same reason, he strongly opposes any interference with the thymus. He consider that from the point of view of prognosis the mental condition is of much more importance than the state of the basal metabolism, and regrets the inattention to the psychic state on the part of surgeons who look no further than the operation-table when a careful noting of the results of psycho-analysis is an essential to success.

J. C. B.

An Aortic sign of Syphilis in Children.

A. Beretervides (*Il Siglo Med.* Ref. Med. World. Jan. 12, 1934) claims great value for the X-ray evidence of congenital syphillis in children. In nearly 500 cases where he has found the shadow of the aorta to be larger, darker, and more distinct than normal, there were unmistakable signs of syphilis elsewhere. In children under eight the shadow should measure not more than 3 cm. in diameter and 1.3 from that age to fourteen. Any excess together with an accentuated second sound heard in the left of the sternum, Beretervides regards as an absolute indication for immediate treatment. He believes that the foundation of the aortitis of maturity is usually laid in childhood, hence its early diagnosis and treatment will save many lives and avoid much suffering.

J. C. B.

SURGERY.

Primary Carcinoma of the Lung: Surgical Extirpation.

Richard H. Overholt (*Amer. Jour. Surg.* Vol. XXII No. 2 1934) states that hitherto the irradiation therapy of primary carcinoma of the lung has been attended with discouraging results. He hopes that with improved technique of taking Röntgenograms and increased accuracy in their interpretations, it may be possible in the future to undertake pulmonary lobectomies not associated with prohibitive mortalities.

In regard to diagnosis, all the same, there are certain difficulties. It is possible for growths to be so situated that no apparent disturbance results, consequently a diagnosis is delayed. If the lesion is growing well out from the hilum, it may assume a fairly large size before symptoms are provoked. A lesion beginning in one of the larger bronchi or outside of them near the hilum will initiate the cough reflex. Partial obstruction in one of the larger bronchi may cause a wheezing type of respiration. If the mucosa of the bronchus becomes eroded, haemoptysis will occur : with superimposed infection the expectoration may be purulent. A breaking down of the tissues in the affected area would also alter the character of the sputum. Chest pain may be present, extension in the mediastinum may give rise to intercostal neuritis.

Röntgenogram of the early lesion shows a dense rounded shadow. Varying degrees of atelectasis may be apparent on the picture. Kerley says that if the vascular markings of the lung are invisible in the light of the peripheral opacity and

visible in the dense opacity near the root, one can diagnose carcinoma with certainty. Associated complication will alter the picture accordingly.

He has reported a case in which he undertook excessive resection of the right lung. The patient had an uncomplicated convalescence and uneventful recovery. Subsequently he was treated with X-rays. Ten months later he died suddenly. An autopsy was not obtainable.

G. M.

Time-shock Factors in general anaesthesia.

W. N. KEMP (*Amer. Jour. Surg.* Vol. XXIII No. 2, 1934) has tabulated and briefly discussed the fundamental, intrinsic and extrinsic conditions that modify and control a person's ability. to undergo with safety surgical interference under general anaesthesia with special reference to time as a factor, in the production of surgical shock.

His classification is as follows :—

A. Time-shock factors related to the general condition of the patient. (1) Obvious and (2) indeterminate time-shock factors in general condition.

B. Time-shock factors related to the operation.
   (1) Lack of preoperative preparation.
   (2) Shock producing nature of the operation.
   (3) Shock producing method of operating.
   (4) The dehydration incidental to operation.

C. Time-shock factors related to the anaesthesia.
   (1) Fear.
   (2) A rapid or stormy induction.
   (3) The use of an unsuitable anaesthetic agent.
   (4) The maintenance of an unsuitable plane of anaesthesia.
   (5) Failure to maintain an open airway and adequate blood oxygenation.
   (6) Failure to offset dehydration.
   (7) Irrational or handicapping posture on operating table.
   (8) Undue cooling of the patient.

Three well known endocrine dysfunctional conditions,—hypothyroidism, diabetes and Addison's disease, lower the subject's resistance to anaesthetic and operative shock, and the autopsy findings of these cases always show hyperplasia of the thymus and lymphoid tissues (particularly mesenteric glands.)

The association of these factors in a person has been termed" Grave's constitution".

G. M.

OBSTETRICS & GYNAECOLOGY.

Ovarian Dermoid

A. KOPCOITZ, M. TACOBI abd N. REIBSTAIN (*Amer. Jour. Surg.* Vol. XXII No. 2 1934) review the various theories of origin of the dermoid.

The first, that dermoids and teratomata arise through misplaced groups of well-differentiated cells in the ovary, has lost generae acceptance. BANDLER derived these cell groups from the region of the pronephros and the wolffian bodies. This theory requires for its acceptance the further hypothesis of metaplasia of widely separated tissues.

The second theory is that of MARCHAND and BONNET who advanced the theory of the origin of these tumors from totipotent, misplaced blastomeres. Originally Marchand believed it impossible that a fertiliesd polar body could wander into the ovum ; there to give rise to the neoplasm. The multiplicity of dermoids in a single individual negatived this original concept.

MARCHAND then advanced his second theory, a corollary of the one advanced by BENNET and himself. It was thought that there were blastomeres, which could sever their connection with their fellows, extend into the ovary or into other region, there to manifest their totipotential character by producing tumors containing elements from all three germinal layers.

The third theory, PFANNENSTIEL'S ovulogenetic theory, was based on the fact that in early embryonic life there is a definite differentiation of the sexual from somatic blastomere (even in the morula stage). Therefore, these cells from which the sex organs develop assume a definite course and development descending from their original locus high in the *anlage* to assume their adult locus in the lower abdomen.

Pfannenstiel believed that, under pathologic stimuli, the primordial follicles, and the oogonia of the embryonic ovary, or in the early post partum life, may be stimulated to produce growth con-

taining elements from all three given layers. For ovarian teratomata Pfannenstiel tentatively suggested the influence of parthenogenetic cellular multiplication.

The authors have reported a case and have discussed the possibilities of the origin of the tumor.

G. M.

Early diagnosis of Carcinoma of Cervix.

J. BEATTIE. (*St. Bartholomew's Hosp. Rep :* 65 151-176 ; 1932) describes examples of abnormal conditions of the epithelium of the uterine cervix following recent or acute inflammation, erosion, or prolapse,which histologically simulate malignancy. Only in a really well-developed case of cervical carcinoma and massive proliferation of solid groups of squamous epithelial cells,which can fairly easily be classified into Broders' four groups. Most cases show such poor differentiation that the more adult type of cell is rarely represented (group of Broders) : many also fall into the fourth group.

The author is mainly concerned with the histologic diagnosis of early cervical carcinoma, and formulates the following rules upon which such a diagnosis must be based. (1) Rapid and abnormal cell division and unclear mitoses which are not normal in type but are irregular in size and shape must be present. (2) The basal layer, of cells, if, present, may be many layers thick and have replaced to a greater or less degree the more adult layers of cells present in normal squamous epithelium. (3) There must be infiltration into the stroma. Finally stroma reaction is so variable that as a means of diagnosis of malignancy or otherwise it should be treated as of no value.

The author has employed the Lugol solution test as used by Schiller (Am. J. Cancer 16 abst P. 643, 1932) and by a few other writers and believes he is the first English-speaking investigator who has carried out research on this test. He has examined 200 cases, in 106 of which histologic examination was made of sections taken from the cervix. In 21 cases the findings were "possibly positive" and the patients have been re-examined from time to time. Two cases of early carcinoma were discovered by this test when there were no clinical signs to suggest malignancy. In one case amputation of the cervix was performed, and serial sections of the removed cervix showed early carcinoma with some local infiltration of stroma. In the second case, in which there was a small papillary erosion, biopsy showed a developed carcinoma which, as in the first case, conformed to the three histologic rules and gave a strongly positive Lugol staining, and panhysterectomy was performed.

Seventeen diagnostic sections taken from the author's Lugol-positive material were sent to Vienna for a histologic opinion from Schiller. He returned these with a full description of each, and in only two cases did he claim that a carcinoma was present ; these sections were from the two cases which had been subsequently proved to be true carcinomas. The author believes that the results obtained with the Lugol test, though somewhat disappointing, justify its further trial, combined with biopsy. He has already re-examined several of the patients, and intends to continue the investigation until at least 400 cases have been examined and, where considered advisable, followed up closely. There are thirteen excellent photo-micrographs and several diagrams.

G. M.

Some aspects of the Menopause.

B. WHITEHOUSE (*Canad. Med. Asson. Jour.*, 29 : 585, December, 1933 Ref. Medical Times Feb. 1934) holds that menstruation is the clinical manifestation of two factors—the luteal or "ovulatory" factor and the oestrual factor, the anterior pituitary-like sex hormone. If the first factor were alone involved, menstruation would represent simply "the abortion of a useless decidua". But menstruation is accompanied by a general and local hyperemia and by the increased thyroid activity which must be attributed to the action of the essential sex hormone. Normally, menstruation results from both necrosis and hyperæmia of the endometrium, but it may be caused by one factor only. The clinical symptoms of the menopause, the author believes, are to be explained as due to "a breakdown in the correlation" between the two factors. Ovulation frequently becomes irregular in the menopause, but the normal cyclical "oestrual" phenomena occur just the same. It is this action of the oestrual factor or essential sex hormone, in the absence of motor disturbances of the menopause. The administration of ovarian

extract containing the oestrual hormone, therefore,is not indicated in the menopause ; it is because it causes a uterine hemorrhage. Insulin is an antidote to oestrin ; and the author has employed insulin in the treatment of a few cases of severe menopausal headaches and flushing with good results. This would also explain why the conservation of the ovaries after hysterectomy does not always prevent the occurrence of symptoms of an artificial menopause.

J. C. B.

MEDICAL JURISPRUDENCE.

Sperm Morphology and Biometrics as a means of identification of the individual.

GIRARD L. MOENCH (*Med. Times* Vol. LXII No. 2, 1934) while working on the problem of human infertility has met with a factor which he believes can be used as a method of identification in some cases.

The author, as already mentioned, investigated the morphology and the biometries of the sperm-cells in 300 individuals. By repeated examination of different parts of the same semen sample and by examining repeated samples from the same man he established the fact that the sperm morphology made up of the different types of cell changes, and the size and variability in size of the sperm heads, were constant and characteristic for the particular individual, so that one could, from an unknown specimen of semen, determine who the patient was, if one had a previous report on the semen of the same man.

In cases of rape, therefore, it can be definitely shown whether the semen from the accused is or is not identical with that in the vagina and on the garments of the outraged woman.

G. M.

Association Notes

Annual Report of the Bengal Branch of the Indian Medical Association for the Year 1933.

Membership

The Bengal Branch entered the third year of its existence in 1933. The present year opened with 235 members in the register and closed with 287. 27 members resigned from membership of the Association during this year. If it would not be for the Government circular forbidding medical men in Government service to become members of the Association, this number would have been much less. 79 new members joined the Association thus showing a net increase of 52 members. This indicated that during the third year of its existence, the progress made had not been unsatisfactory. A substantial increase of membership is expected during the next year.

General Meeting

At the last Annual General Meeting the following office bearers were elected :—

Executive Committee

Dr. B. C. Roy	*President.*
Dr. K. S. Ray, ,, J. N. Bose, ,, C. C. Bose, Lt. Col. K. K. Chatterji, Sir Hasan Sihrawardy	*Vice-Presidents.*
Dr. H. Ghosh	*Secretary.*
,, Girin Mukherji, ,, P. C. Chakraborty	*Asst. Secretaries.*
,, A. K. Chakraborty	*Treasurer.*

Committee members

1. Sir Nilratan Sircar.
2. Dr. R. C. Sen.
3. ,, S. C. Sen Gupta.
4. ,, H. Ganguly.
5. ,, A. M. Mallick.
6. ,, A. C. Ukil.
7. ,, Khagendra Nath Ghosh.
8. ,, K. C. Chaudhuri.
9. ,, P. C. Roy.
10. ,, K. B. Mukherjee.
11. ,, S. K. Basu (Kidderpore).
12. Dr. S. M. Das.
13. ,, Sudhangsu Kumar Ghosh.
14. ,, Tarak Nath Ghosh.
15. ,, Sushil Kumar Sen. } From Mofussil
16. ,, B. K. Ghosh
17. ,, Sailesh C. Bhowmick
18. ,, Dhirendra Nath Ghosh
19. ,, J. R. Dhar.
20. ,, Satyaranjan Ghosh.
21. ,, S. P. Sen Gupta (from Comilla Branch).

Executive Committee Meetings

During the year there were 10 meetings of the ExecutiveCommittee all of which were well attended.

Activities of the Association

For the proper working of the Association several sub-committees were formed each having a convenor on whom rested the responsibility of organising the subject concerned. The following sub-committees worked during the year under review, viz :—

1. Members Benefit Fund Sub-committee.
2. Public Health Sub-committee.
3. Library Sub-committee.
4. Entertainment Sub-committee.
5. Scientific Sub-committee.
6. Rules and Bye-laws Sub-committee.
7. Finance Sub-committee.

Members Benefit Fund Sub-committee

On the proposal of Dr. H. Ganguly it was resolved at a meeting of the Executive Committee held on 2nd May, 1933, that a Mutual Benefit Fund of the Indian Medical Association, Bengal Branch, be created with subscription from members of the Association with a view to help the family of any member in case of his death. To materialise the scheme a sub-committee consisting of the following members was formed :—

1. Dr. H. Ganguly.
2. ,, P. C. Chakraborty (Convenor).
3. ,, S. P. Sen Gupta.
4. ,, J. N. Dutt.
5. ,, N. N. Basu.
6. ,, G. Mukherji (Co-opted).

This sub-committee submitted an elaborate draft scheme of the Mutual Benefit Fund to the Executive Committee which at its meeting held on 27-1-34 adopted the scheme. It is expected that the scheme will be put into operation during the next year.

Public Health Sub-committee

Pursuant to a letter from the Secretary, All-India Women's Conference, the Executive Committee in their meeting held on 2nd May, 1933, formed a Public Health Sub-committee consisting of

1. Dr. B. B. Saha.
2. ,, K. C. Chaudhuri.
3. ,, J. N. Dutt.
4. ,, G. Mukherji.
5. ,, P. C. Chakraborty (Convenor).
6. ,, N. N. De (co-opted)
7. ,, Sudhir Bose (co-opted).
8. ,, N. L. Ghosh (co-opted).

to hold free periodical inspections of health of school girls twice or thrice a year. With this view the committee collected information and literature relating to organised health examination from different institutions. In compliance with the request from the Secretary, All-India Women's Conference, to examine the pupils of a Girls' High School. the Committee undertook to co-operate and sent to the Secretary the names of persons willing to undertake the examination. But due to some objections raised by the parents of the girls nothing definite could be done.

Library Sub-committee

The absence of a library was keenly felt by this Branch, and therefore reference books to the value of about Rs. 650/- were purchased, and permission was obtained from the Central Committee. of the I. M. A. to allow our members to use the periodicals of the Central Committee.

The Branch felt the necessity of a reading room for the members. An additional room has been taken to remove this want.

Scientific Sub-committee

Fifteen scientific papers were read during the year. These meetings were very well attended and the members present showed great interest in the discussion which followed at each of these meetings :—

No.	*Date.*	*Names of Speakers.*	*Subjects.*
1.	2-2-33	Dr. B. B. Saha ..	.. Treatment of Anaemia.
2.	16-2-33	Dr. Bireswar Mitra ..	.. Head Injuries.
3.	2-3-33	Dr. S. Sarbadhikari ..	.. A new solvent of Sanocrysin in the treatment of Pulmonary Tuberculosis.
4.	16-3-33	Dr. Satyaban Roy ..	.. Suppurative Otitis Media: its prevention and treatment.
5.	30-3-33	Dr. K. B. Mukherjee ..	.. Some points in the diagnosis of Syphilitic infection.
6.	27-4-33	Dr. Subodh Mitter ..	.. Anaemia of Pregnancy.
7.	11-5-33	Dr. N. R. Sen Gupta ..	.. Management of Enteric cases.
8.	25-5-33	Dr. Nandalal Mukherjee	.. Gold therapy in Pulmonary Tuberculosis.
9.	13-7-33	Dr. Girin Mukherji ..	.. Aschheim-Zondek reaction of Pregnancy.
10.	3-8-33	Dr. B. C. Roy ..	.. Treatment of Anaemia.
11.	17-8-33	Dr. D. N. Banerjee ..	.. Cholecystography.
12.	31-8-53	Dr. Charu Ch. Bose ..	.. Interpretation of clinical blood examinations.
13.	14-9-33	Dr. J. C. Banerjea ..	.. Psychoneuroses and its manifestations in general practice.
14.	9-11-33	Dr. Harinath Ghosh Rai Bahadur..	Mental deficiency in childhood.
15.	23-11-33	Dr. Sunil C. Bose	Syphilitic heart disease.

Dr. Philip Rezek, a heart specialist from Vienna, delivered a course of three lectures on "Angina Pectoris". These meetings were also well attended by members of the Association as well as non-members.

There was also a course of Extension Lectures on "Cardio-vascular" system which lasted from 27-11-33 to 18-12-33. Most of the prominent members of the medical profession of Calcutta took part in this course. A large number of medical men attended the whole course of the lecture. An epidiascope was purchased at a cost of Rs. 560/- for demonstration purpose,thus removing a longfelt want of the Association. The Association owed its thanks to Dr. C. C. Bose, Dr. N. R. Sen Gupta and Dr. J. N. Dutt who devoted much time and energy for the success of the extension lectures.

Other activities

The branch was asked to send its representative to the Advisory Board of the combined Commercial Museum and Publicity Section of the Calcutta Corporation. Sir Nilratan Sircar was elected to represent the Association to the Advisory Board.

There was an outbreak of Typhoid epidemic in Calcutta during the months of August, September and October last. The Chairman of the Health Committee of the Corporation of Calcutta called a conference to discuss the problem of the epidemic. The Association was requested to send a representative to assist in the Conference. The Secretary represented the Association at the Conference and took part in the deliberation of the conference.

The branch was also consulted regarding the proposed Bengal Nurses Bill. The Association duly submitted its opinion on the same and we hope it will receive due consideration from the authorities.

The Association made strong agitation to change the objectionable clauses of the Indian Medical Council Bill. The Association deputed Dr. K. S. Ray and Dr. A. C. Ukil to Delhi to represent the view point of the Association to the Hon'ble Member-in-Charge of the Bill. The Association greatly appreciated the services of both Dr. K. S. Ray and Dr. A. C. Ukil who went to Delhi at great personal sacrifice. It is gratifying to note that due to the agitation and propaganda made by the Association many of the objectionable clauses of the Bill have been changed or deleted.

Social function

One social gathering was organised during the year. Tea and light refreshments were served and the function was a great success. Besides this social party the Association served light refreshments to all the members who attended the Scientific Meetings.

Xth All-India Medical Conference

The following delegates from Bengal attended the tenth All-India Medical Conference held at Bombay in the month of December last. All the Bengal delegates took very active part in the deliberations of the Conference :—

1. Dr. B. C. Roy.
2. ,, K. S. Ray.
3. ,, D. P. Ghosh.
4. ,, S. C. Sen Gupta.
5. ,, J. N. Bose.
6. ,, A. K. Sen.
7. ,, H. N. Ray.
8. ,, S. P. Sen Gupta.
9. ,, A. K. Chakraborty.
10. ,, A. N. Ghosh.
11. ,, H. Ghosh.
12. ,, N. N. Basu.
13. ,, A. D. Mukherji.
14. ,, J. R. Dhar, Jessore.
15. ,, R. L. Bhattacharyya.
16. ,, K. C. Bose.
17. ,, D. N. Banerjee.
18. ,, B. B. Sen.
19. ,, A. N. Roy.
20. ,, P. C. Roy Rai Sahib.
21. ,, Sital Chandra Dutt Rai Sahib.
22. ,, Satyaranjan Ghosh, Faridpore.

According to Rule 21 of the Indian Medical Association the Bengal Branch nominated the following for election of President of the Xth All-India Medical Conference :—

1. Dr. M. A. Ansari.
2. ,, B. C. Roy.
3. Sir Nilratan Sircaar.
4. Dr. Jivraj Mehta.

and according to Rule 23 of the Indian Medical Assaciation the Bengal Branch proposed the

following names for nomination as Vice-Presidents of the Indian Medical Association :—

1. Col. Bhola Nauth (Punjab)
2. Dr. J. N. Bose (Bengal)
3. Col. Rama Rau (Madras).

Dr. J. N. Bose was duly elected as one of the Vice-Presidents.

Dr. B. C. Roy, President of the I. M. A., Bengal Branch, was elected President of the last All-India Licentiates Conference held at Bombay in the month of December last.

Financial position

The financial position of the Branch will be seen in the audited accounts enclosed herewith.

Acknowledgments

The Association is grateful to Dr. R. C. Sen for presenting the Library with nearly 200 copies of the British Medical Journal. The Association also owes its thanks to Messrs. K. C. Bose & Co., for their free supply of biscuits throughout the year for members attending the Clinical Meetings. We must thank Rai Bahadur Dr. U. N. Brahmachari and Dr. N. R. Sen Gupta and other members of the Association who have given substantial donation to the Association for the purchase of the epidiascope.

Contribution to the Central Fund

The Bengal Branch contributed Rs. 681/- to the Central Fund in respect of 227 members for the current year, and also paid the arrears of Rs. 234/- for last year in respect of 78 members.

B. C. Roy, *President.* H. Ghosh, *Hony. Secretary.*

67, Dharamtala Street,
Calcutta, the 9th March, 1934.

INDIAN MEDICAL ASSOCIATION

(Bengal Branch)

67, Dharmatala Street, Calcutta.

Receipts and Payments Account for year ending 31st December 1933.

RECEIPTS.			Rs.	A.	P.
To	Balance of cash in hand	.. ..	36	1	3
,,	Balance of cash at Bank	.. ..	585	2	4
,,	Subscriptions		3,020	0	0
,,	Donations		255	0	0
,,	Bank Interest		5	2	0
,,	Darwan's deposit		3	0	0
,,	Social Gathering		69	8	0
,,	Receipts from Scientific Sec.		122	0	0
,	Received from Central Council & Journal				
	House rent 683-4-9				
	Telephone 120-6-0				
	Electricity 74-6-3				
			878	1	0
	Rs. ..		5,251	14	7

PAYMENTS.			Rs.	A.	P.
By	Postage	206-15-0			
	Less recd.	1- 4-0			
			205	11	0
,,	House rent		1,100	0	0
,,	Telephone		230	0	9
,,	Electricity		141	13	3
,,	Stationery	84-12-9			
	Less recd.	3- 9-0			
			81	3	9
,,	Social Gathering		75	1	6
,,	Establishment		745	14	0
,,	General charges		65	3	6
,,	Entertainment		75	4	9
,,	Bank charges	4-8-0			
	Less recd.	0-8-0			
			4	0	0
,,	Furniture		589	10	0
,,	Printing		29	14	0
,,	Contribution		915	0	0
,,	Books		640	1	0
,,	Audit Fee		50	0	0
,,	Travelling expenses		64	0	0
,,	Loan paid		25	0	0
,,	Scientific Section		43	6	9
,,	Cash in hand	84-15-0			
,,	Cash at Bank .. ,,	85-11-4			
			170	10	4
	Rs. ..		5,251	14	7

INDIAN MEDICAL ASSOCIATION

(Bengal Branch,)

67, DHARMATALA STREET, CALCUTTA.

Income and Expenditure Account as at 31st December 1933.

EXPENDITURE.						INCOME.					
			Rs.	A.	P.				Rs.	A.	P.
To Stationery	..	..	79	7	9	By Subscriptions	..	..	2,862	0	0
„ Postages	..	..	205	11	0	„ Do. in arrears for 1931	319/-				
„ General charges	..	..	65	3	6	1932	135/-		454	0	0
„ Social gathering	..	..	5	9	6						
„ Entertainment	..	..	75	4	9	„ Bank interest	..	..	5	2	0
„ Printing	..	..	101	10	0	„ Scientific Section	..	..	78	9	3
„ Establishment	..	..	752	14	0	„ Donations	..	..	533	0	0
„ Telephone	..	..	104	4	10						
„ House rent	..	..	533	5	11						
Electricity	..	..	66	3	3						
Contribution to Central Council		..	837	0	0						
„ Audit fee	..	..	50	0	0						
Bank charges	..	..	3	0	0						
„ Travelling expenses	..	..	64	0	0						
„ Written off as irrecoverable—											
Subscription 1931	..	319/-									
Do. 1932	..	135/-	454	0	0						
„ Written off—advance as irrecoverable		..	6	12	0						
Balance—Surplus o Income over Expenditure	..	..	528	4	9						
	Rs.	..	3,932	11	3		Rs.	..	3,932	11	3

INDIAN MEDICAL ASSOCIATION

Bengal Branch.

67, DHARMATALA STREET, CALCUTTA.

Balance Sheet as at 31st December 1933.

LIABILITIES.						ASSETS.					
			Rs.	A.	P.				Rs.	A.	P.
Contribution to Central Council	..	..	177	0	0	Furniture :—					
Subscription received in advance	..	..	21	0	0	As per last Balance Sheet	411 0 0				
For expenses :—						Addition during the year	763 10 0		1,174	10	0
Rent	..	200 0 0									
Telephone	..	27 1 11				Books purchased	..	..	640	1	0
Electricity	..	13 0 0				Subscriptions in arrears	..	..	518	0	0
Salaries	..	68 0 0				Due from the Central Council on account of share of expenses :—					
Printing charges	..	81 4 0	389	6	8	Rent	..	50 0 0			
Ghosh Pharmacy for Epidiascope	..	..	174	0	0	Telephone	..	25 7 3			
Darwan's deposit	..	..	3	0	0	Electricity	..	11 7 3	86	14	6
Association Fund :—											
As at 31-12-1932						Election expenses recoverable	..	..	250	0	0
As per last Balance Sheet		1,547 8 5				Cash in hand	..	84 15 0			
Surplus during the year as per Income & Expenditure A/c,	..	528 4 9	2,075	15	2	„ at Bank	..	85 11 4	170	10	4
	Rs.	..	2,840	3	10		Rs.	..	2,840	3	10

I have examined the above accounts together with the Books and Vouchers, and find the same to be correctly stated.

Sd/- A. M. ROY,
M.A., B.Com. (Edin.),
F.S.A.A., C.A.,
Chartered Accountant.

Dated, Calcutta, The 21st February, 1934.

The Allahabad Medical Association.

The annual meeting of the Allahabad Medical Association took place at the Association premises. Major D. R. Ranjit Singh the President was in the chair.

The annual report was read by the recording secretary, Dr. Lakshmi Narain Srivastava. It contained a resumè of the whole year's activity of the Association. There were movie shows on different medical and scientific subjects at every monthly meeting. Some thirty new members were enrolled during the year. Now practically all the medical men of Allahabad are members of the Association.

The monthly meetings took place at the Association premises as well as at the houses of members who entertained them sumptuously. It is gratifying to note that average attendance was more than any in previous years.

During the present year the Association for the first time is lodged in its own premises.

The following office bearers were then elected for 1934.

President : Major D. R. Ranjit Singh, O.B.E. ; K.I.H., L.M.S., Ex. I.M.S.

Vice-President : 1. Khan Sahib Dr. Zahid Hussain, L.M.P., P.M.S. (retd).
2. Dr. N. C. Maitra, L.M., L.R.C.P., L.R.C.S., L.M.S.

General Secretary : Dr. S. N. Basu, M.B.

Recording Secretary : Dr. Lakshmi Narain Srivastava, L.M.P.

Librarian : Dr. J. Sen, M.B.

Treasurer : Dr. N. Mukherjee, M.B., B.S.

Rai Bahadur Captain R. N. Banerjee, B.Sc., M.B., B.S., A.I.R.O. Dr. Kulwant Rai, M.B., B.S. and Dr. Jai Raj Behari Mathur, B.Sc., M.B., B.S., were elected members of the Executive Committee.

Medical News and Notes.

[Items of news and notes of general interest to the profession for incorporation in this section from the members of the profession will be greatly appreciated—EDITOR]

Cultivation of Larvicidal Fish for the Control of Malaria.

On the 2nd Dec. 33. Lt. Col. G. COBEL, M.D., I.M.S., Asst. Director of the Malaria Survey of India paid a visit to the Mosquito control department of the Calcutta Corporation. He inspected the laboratory and expressed his satisfaction at the interest taken by the Corporation for the eradication of malaria from this big town. He, however, suggested several improvements in the workings of the department in course of which he advised the department to carry on an experiment and culture of the American larvicidal fish, *Gambusia*, in the tanks of Calcutta and offered to supply the fish, from his field-station at Karnal (Punjab). He further advised them to send experts to Bombay to study the anti-malarial measures persued there for many years.

Asthma Research in the Leeds Asthma Clinic.

As a result of investigation of about 2000 cases of asthma, abnormalities of the nose and throat were found with great frequence (in 77.9% of the cases). Partial or complete success was gained in many cases which received operative treatment of the nose or throat. This method of treatment benifitted 50.4% of the cases and less than 3% cases were permanently relieved of their asthma. Observation has, further, given good results with the use of liver extract administered by the intramascular method which is more effective than when it is administered orally.

Britain for the British medical Practitioners

We are told by the Medical World (of 22-12-33), the official organ of the Medical Practitioners' Union, London, that in a meeting of the executive of the Glasgow and west of Scotland Branch of the Medical Practitioners' Union, the attention was drawn to the alarming condition created by the foreign refugees who obtain medical qualification in that country with a view to establish there for practice when so many British practitioners are finding it so hard to earn an adequate competence from their professional labour. As a result of their communication with the Home Office, the Minister of State informed the Union in reply that in future their views will be borne in mind in connection with such application received from foreign persons. The official reply goes on to state that every foreigner admitted to this country for the purpose of medical study, is warned that his adminission for this purpose affords no guarantee that he will be allowed to settle, in this country to practice when qualified.

Campbell Medical School Reunion

The Second Session of the Campbell Medical School Reunion was opened on 15th January, 1934, under the presidentship of Rai Saheb Dr. Grirish Chandra Bagchi, who passed from this School in 1878, the year just preceeding the year in which Sir Nilratan Sircar passed out from this School. There was a large gathering of students and exstudents; prominent among whom were Drs. Gopal Das Gupta (1886), Manmatha Chatterjee (1894), Surendra Mukherjee, Rai Sahebs Dr. P. C. Roy, and S. C. Dutt. After President's speech, members and guests numbering about 1000 were treated to light refreshments and tea. Drs. Amulya Mukherjee, Amrita Roy and Santi Roy were all attention to the guests.

In the morning at 9 a.m. Sir Hasan Surhawardy opened the Medical and Scientific Exhibition in the Hospital Compound before a large gathering. Being requested by Lt. Col. N. C. Kapur, I.M.S., Superintendent of the School to open the Exhibition Sir Hasan said that since the time he was a member of the staff of the Campbell Hospital he cherished a very high opinion about the students of the Campbell Medical School which is the premier Medical School in India and produced largest number of Doctors many of whom have established reputation which is the cause of envy to many. Personally he had a very high regard for

the Licentiates for their diagnosis and treatment and whenever he fell ill he placed himself under the treatment of the class of doctors produced by the Campbell School. Inspite of a great many handicaps placed in their way it is really very gratifying to find the Campbell boys maintaining a record which every one should be proud of. Regarding the Exhibition he said that exhibitions like this afford opportunities to the manufacturers as well as the doctors to come in closer contact with each other. He fully sympathised with the efforts at the manufacture of drugs, instruments and appliances in this country on a much wider scale. He then declared the exhibition open. After which Dr. Amrita Nath Roy while proposing a vote of thanks to Sir Hasan said that they were much encouraged and touched at the compliments paid to the doctors who have passed out of the Campbell and it is really gratifying that a responsible person like Sir Hasan holding the scale of education in Bengal as the Vice-Chancellor of the Calcutta University has acknowledged the attainments of the Licentiates. It is really very gratifying to note that Sir Hasan tried his best to do away with the barriers that are artificially placed by the University on the onward march of the educational progress of the Licentiates. Dr. Roy said that it was very unfortunate that merit does not count with the obstructionists who are all educationists and appealed for a wider outlook and changed mentality. Sir Hasan and Colonel Kapur were then led to each of the stalls of exhibitors by Dr. Amulya Mukherjee, the Secretary and they all evinced a keen interest in the exhibits prominent amongst whom were those of Messrs. B. K. Paul & Co., Bengal Chemical, Sarkar Gupta, Schering Kahlbaum (India) Ltd., Park Davis & Co., and H. Mukherjee & Co., In the night the students staged "SHAHJAHAN". On the morning of 16th and 17th January, there were very interesting Clinical Demonstrations in the Wards and scientific papers were read, cricket matches and a very interesting and prolonged programme of musical *soiree* in the evening when a large number of prominent artists entertained the audience till the early hours of the next morning. On the 17th at 5 p.m. the closing meeting was held when Secretarys' report together with statement of accounts were passed and office bearers were elected. The function terminated with the dramatic performance of "PUSHYAPUTRA" by the Doctors.

Bogus Doctors Convicted at Gujranwala, (Punjab).

The Punjab Medical Council, thanks to the efforts of its energetic Registrar, is back to life again, and the campaign launched against the Bogus Practitioners in the Punjab is a step in the right direction. The profession is deeply indebted to the Council for this healthy move, Recent convictions of three local practitioners with bogus degrees, viz. Roshan Lal Kapur who has been fined with Rs. 100 and Messrs. Hakim Mohd Din and Yog Raj who have been fined Rs. 25 each, have had very salutary effect on the local public. The efforts of the local Secretary of The All India Medical Licentiates' Association,Gujranwala Branch, in this direction are highly commendable.

The one sad feature of these convictions,however, has been the fact that one of the Registered Medical Practitioner who is President of the Indian Medical Association, Local Branch, sided with the defence. One can easily understand and even ignore the indirect support of the other gentleman who is one of the Office-bearers of the parent Association, i.e., The All India Medical Licentiates' Association, in as much as one of the accused, viz. Roshan Lal Kapur, happened to be his own brother. It is expected that the Council will devise ways and means to maintain the dignity and integrity of the profession.

(*From Secy. All India Medical Licentiate's Association, Gujranwala*).

The Menace of Dumping of German & other Foreign Doctors in Bombay.

By Dr. K. K. Dadachandji.

The medical profession of Bombay is much agitated about the unrestricted admission of foreign doctors, and particularly German Jews, who have been expelled from their own country under the Nazi regime. Thus India is fast becoming the dumping ground for German and other foreign doctors. The profession in Bombay is already much overcrowded, and there is growing and extensive unemployment among the members.

This unrestricted dumping of foreigners is a new meance, which has already increased the unemployment among the Bombay doctors.

Just as there is unrestricted dumping of foreign drugs, from all parts of the world into India, so now this dumping of foreign doctors has started. The main reason for such dumping is the absence of all restrictive legislation in India against the dumping of foreign goods and of foreign practitioners, such as exists in all other civilised countries.

India is thus at a great disadvantage in this menace of unwanted ingress of foreign practitioners and goods. It is very unfair that whilst Germany prohibits medical practice to Indian doctors qualified in India, on the other hand, any foreign medical practitioner has the privilege of settling in any part of India without any restriction whatsoever.

The so-called Indian Medical Council has now been formed, but it has no power to prohibit the practice of medicine by foreigners in India. Thus the Council is impotent so far as this great problem of medical practice in India is concerned. The only power it possesses under the Act is that of entering into schemes of reciprocity with foreign countries within four years i.e., the mutual recognition of degrees and diplomas. However, the fundamental absurdity of this power can be realised from the fact that even in the absence of recognition of any foreign degree and diploma, any foreign doctor can come to India and practise in India without any restriction, whilst no Indian doctor, inspite of his Indian degree and doploma, can practise in any of the foreign countries.

It is interesting to read the following account of a meeting of the Bombay Rotary Club held on the 20th February last, as published in the papers. Rotarian Dr. J. N. Duggan, who occupied the Chair, asked Rotarian Dr. Adalbert Fuchs of Vienna at the end of his lecture, what the position was, in Austria and Germany, with regard to doctors holding foreign qualifications practising in those countries. An Indian doctor, with degrees obtained in India, could practise in England, and many had done so, establishing good practices, Could Indian doctors do so in Vienna or Berlin, etc. ? He wanted to know because German and other doctors were practising in India and there ought to be reciprocity. Dr. Fuchs replied that they could not so practise unless they had diplomas obtained in Austria. The position in Berlin and Vienna was not exactly similar, and he explained it in detail.

Our case is that we are sending hundreds of Indian medical students and Graduates to study in foreign countries including Germany and Austria, and their parents are put to heavy expenses. When these students return to India they will find that the foreign practitioners have already established themselves in India and so there will be little or no scope for their talents and the money spent on their education will be watsed. Thus, it will be clear that India does not stand in need of any foreign medical practitioners. The medical profession is united in its demand for prohibiting this dumping of foreign practitioners into India. The remedy is self-evident. The Central Legislature should undertake early to amend the Indian Medical Council Act, 1933, so as to empower the Council to prohibit, under heavy penalties, the practice of medicine by any foreign medical men, coming from a country, which prohibits Indian doctors to practice medicine there. France, Germany, Austria, etc., and the United States of America prohibit the practice of medicine by foreigners. There is no reason why India should be left helpless in this matter.

In India there are already some 30,000 *duly qualified practitioners, whose economic condition is precarious, and which will be made worse by the dumping of unwanted foreigners.* The profession has the right, and not only the right but also the duty of self-preservation towards itself, to deman the urgent passage of legislation for prohibiting the practice of medicine by foreigners in India. In fact, the general opinion among the members of our profession is that only Nationals of India should be allowed to practise in India. It must further be made perfectly clear under the proposed legislation that no foreigner can practice in India whether as a possessor of medical degree and diploma, duly recognised for practice in his own country, or otherwise. To put it in plain language, no foreigner, whether he is a duly qualified medical man or whether he is a quack, can practise medicine in India, unless Indian Nationals are allowed to practise medicine in those foreign countries.

At the 10th All-India Medical Conference, held in Bombay in December last, the first Resolution laid down that "the time has arrived in the interests of the solidarity and the unity of the profession to hold the Annual Conferences of both the the allied Associations, viz., the Indian Medical Association and the All-India Medical Licentiates'

Association during the same week at the same place place every year, and to consider and take necessary joint measures for the benefit of the profession and of the public, and to present a united front in all problems affecting the medical profession in India.

As this menace of foreign dumping is an all-India menace, and foreign practitioners are as likely to settle in Calcutta and other Cities as in Bombay, the medical profession in India must present a united front at the very start, and not sit with folded hands till the menace has grown to a vast extent.

The medical men are under the wrong impression that the Provincial Medical Councils of Registration and the—recently formed Indian Medical Council of Higher Medical Education are bodies empowered to safeguard the economic position of the profession. Such an impression is entirely groundless. It is not the function of any of these medical Councils, whether Provincial or Central, to safeguard the economic interests of the profession in any sense of the term. They are absolutely impotent in the matter. Hence I believe that looking at the past experience of the working of these Councils, they will not succeed in achieving the purpose we have in view, viz., the restriction of practice of medicine to the Nationals of India, and the prohibition of such practice to Non-Indian Nationals.

I would, therefore, suggest that a new Bill should be drafted on the lines of the Indian Medical Degrees Act No. VII, of 1916, The Bill may be called the Indian Medical Practice Bill, 'a *Bill to regulate the practice of medicine in India and to prohibit the practice of medicine in India by foreigners.*' India should no longer form a happy dumping ground for the unemployed medical men of ther countries.

It need not be pointed out that the legal profession is fully protected against unfair competition by legislation which restricts the practice of law to only duly qualified and enrolled members of the profession, so that no—person can practice in the courts without a Sanad. The Clerical profession is fully protected, for instance, no one can become a Christian, Hindu or Mahommedan priest except under the specified conditions. As regards other professions also, they are to some extent protected. The only profession therefore left unprotected at the mercy of *unrestricted and unfair* competition is the medical, which is already over-crowded.

However, the progressive Baroda State has recently passed the Baroda Medical Act, which restricts the practice of medicine to persons duly registered under the Act, and prohibits the practice of medicine by unregistered persons and quacks Indirectly, this Act will prevent foreigners from practising in the State as they cannot be registered under the State Act.

The Indian Medical Association and All-India Medical Licentiates' Association should now join hands and appoint a Medico-Economic Committee for the purpose of sageguarding the economic interests of the profession, as laid down in the Resolutions passed at the recent Medical Conferences held in Bombay during last December. These two Associations should also agitate for the passage of legislation to prohibit the practice of medicine by foreigners in India.

The profession must cultivate the sense of selfpreservation particularly in its economic aspect, and follow the example set by the well organised British Medical Association and other National Medical Associations in civilised countries, which are working with success for the economic self-preservation of the profession in their own countries.

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